CHEMICAL LIBRARY

JUL 20 1925

AMERICAN JOURNAL of PHARMACY

SINCE 1825

A Record of the Progress of Pharmacy and the Allied Sciences

COMMITTEE ON PUBLICATION.

Charles H. LaWall, Ph. M., Sc. D. Joseph W. England, Ph. M. J. W. Sturmer, Pharm. D.
John K. Thum, Ph. M. Arno Viehoever, Ph. D. E. Fullerton Cook, Ph. M.
IVOR GRIFFITH, Ph. M., Editor
Henry Leffmann, A. M., M. D., Special Contributor

Vol. 97 JULY, 1925 No. 7

CONTENTS

Editorial:
The Banquet of the Elements. (Two New Guests Arrive) 441
A Poet-Botanist 443

Selected Editorial:
The Centenary of Benzene 445

Original Papers:
A Physico-Chemical Study of U. S. P. Agar. By Ellery H. Harvey, Madison, Wis. 447
A Study of the Influence of the pH Concentration Upon the Stability of Digitalis Infusion and Potassium Citrate Mixtures. (Illustrated.) A contribution by the Plaut Research Laboratory, Bloomfield, N. J. 456
The Tannin of Rhus Glabra. By Josiah C. and Bertha L. DeG. Peacock, Philadelphia 463
Bacillus Acidophilus Preparations. By Josiah C. Peacock, Philadelphia 471
The American Pharmaceutical Association, the Greater Opportunities of Pharmacy and the American Pharmacy Headquarters. By Eugene G. Eberle, Philadelphia 477
Medical and Pharmaceutical Notes 491
News Items and Personal Notes 497
Book Reviews 500

Price $3.00 per Annum in Advance. Foreign Postage, 25 Cents Extra.
Single Numbers, 30 Cents. Back Numbers, 50 Cents.

Entered as Second-Class Matter at the Post Office at Philadelphia, Pa., Under the Act of March 3, 1879.

Acceptance for Mailing at Special Rate of Postage Provided for in Section 1103, Act of October 3, 1917. Authorized February 15, 1920.

PUBLISHED MONTHLY BY THE

Philadelphia College of Pharmacy and Science

145 North Tenth Street, Philadelphia

American Journal of Pharmacy

ESTABLISHED IN 1825

Four preliminary numbers were published at different times until in 1829, when the publication of the regular volumes began. Since then the publication has been uninterrupted. During the period from 1829 to 1852 four numbers were published annually, except in 1847, when five numbers were published. From 1853 to 1870 six numbers were published. Since this time twelve numbers have been published annually.

MANUSCRIPTS should be sent to the Editor. It should be stated in this connection that the Editor does not assume any responsibility in connection with the views or investigations of contributors, other than to exercise general care in the selection of matter.

Contributors are allowed a reasonable number of copies of this JOURNAL, free of charge, if applied for when the proof is returned.

REPRINTS, if desired, must be applied for when the proof is returned. The table below shows the *approximate* cost of reprints, the make-up of the pages to be identically the same as in the JOURNAL. The actual cost may vary from the figures given, and will depend upon the amount of presswork, paper, binding, etc. Reprints containing half-tones may be expected to cost somewhat more than the rates given.

	2 pp.	4 pp.	8 pp.	16 pp.
25 copies	$2.25	$3.75	$7.75	$9.00
50 "	2.50	4.00	8.25	9.75
100 "	2.75	4.25	9.00	10.75
250 "	3.75	4.75	10.00	12.00

COVERS WITH TITLES	
25 copies	$1.75
50 "	2.00
100 "	2.25
250 "	2.75

☞ **Our readers will find it to their advantage to carefully consult the advertising pages when desiring to correspond with STRICTLY FIRST-CLASS PARTIES.**

THE AMERICAN
JOURNAL OF PHARMACY

VOL. 97. JULY, 1925. NO. 7.

EDITORIAL

THE BANQUET OF THE ELEMENTS.

TWO NEW GUESTS ARRIVE.

Moseley, the brilliant young English physicist whose fruitful life was lost in England's cause during the World War, passed away in the hey-day of his scientific glory and with him into the everlasting silence went many, many potential secrets, which will remain untold until another kindred mind will sense again the things that Moseley sensed.

For Moseley was a man who saw tomorrow. Many years before him, the Russian, Mendeléeff, another sapling mind, had also looked ahead. He, like Moseley, had seen as others could not and with the unselfishness that marks the true scientist, both had shared with all the world their precious information.

And long before them, dabblers in alchemy, searching for the same intelligence, had come to the fanciful conclusion that all matter was built of five elemental things. Four they named—air, earth, fire and water; the fifth, which they knew not, they promptly called the *quintessence,* for lack of a better name.

Then through the advancing centuries men had continuously wondered and wondered as to the real number of elements that figured in the constitution of all material things.

But it remained for Moseley to visualize the actualities and to call to assembled convention these silent builders of the universe—the elements.

Helped along by the roentgen-ray spectroscope, his genius called them all to task and made them all respond, if not in person, at least by proxy. The final count showed that they numbered ninety-two. "Ninety-two," said Moseley, "ninety-two, not one less, nor one more, constitute the complete group of the earth's elemental builders." He grouped these elements around the table (the periodic table) selecting

for each a worthy seat, according to its atomic weight and certain other properties.

But six were missing from their places.

Empty chairs for 43 and 61, for 72 and 75, for 85 and 87. Said Moseley: "This will never do, ninety-two places have I set and my ninety-two guests must come. Science will search, and search, and search until the last, lone element comes on to fill the only empty seat."

So science went out to search. Moseley passed on to the Infinite, but his comrades still carried on. And not a word came to count the progress of the search for the vagrant guests until the day when two Danish professors, between them, dragged to the waiting table a guest, called Hafnium, the missing element of seat number 72. This element possesses all the earmarks which Moseley had announced for one of the then absent six. Science is now satisfied that this was not a case of mistaken identity and the new guest contentedly sits with his fellows eagerly awaiting the coming home of the tardy three.

Hafnium was in hiding in Norway and Drs. Coster and Hevesy, who used the X-Ray spectroscope to rout it out, decided that the name of the element should be after Hafnia, the Danish for Copenhagen, where their great work was done.

Hafnium has an atomic weight of about 180 and is chemically allied both to the rare earths of the thorium group, and to titanium and zirconium. Oxides of these elements are used in gas mantles and it is thought that the oxide of the new element may be so used.

And now two other guests are come in the persons of rhenium and masurium, numbers 43 and 75, respectively. Again it was the X-Ray spectroscope that routed them out.

Passing these rays through concentrated solutions of rare minerals enabled Dr. Walter Noddack, of the University of Berlin, assisted by Otto Berg and Ida Tacke, to discover these missing chemical elements which are in the group with manganese in the periodic table. Traces of them have been detected in the concentrated solutions of platinum ores and of the minerals gadolinite and columbite, and it is estimated that they form a billionth of the earth's crust. Dr. Noddack named them masurium and rhenium after the territories lost by Germany as a result of the peace treaty, the Masurian region of East Prussia on the east and the Rhine provinces on the west.

With the discovery of the new elements, there are only three vacant places left in the periodic system, which have the numbers 61, 85 and 87. These, like masurium and rhenium, which are numbers 43 and 75, are odd numbers, as it is a curious fact, pointed out by Professor Harkins, of the University of Chicago, that in the case of elements of high atomic weights, those of even number are more common.

So there are now but three empty chairs at the great periodic table.

And the voice of Moseley still persists.

"One by one," it echoes, "until the total comes to ninety-two, not one less, not one more."

IVOR GRIFFITH.

A POET-BOTANIST.

The occurrence of an anniversary of the birth of Chamisso, who, though born in France, is regarded as a German poet, leads Dr. Wächter, of Munich, to give a description of some of the salient features of his life. The essay is published in the *Schweizerische Apotheker-Zeitung* (1925, *63*, 45).

Adelbert von Chamisso was born in Champagne, France, in the latter part of January, 1781. His family was of aristocratic grade, and in the dark period of the French Revolution he "emigrated" to Prussia, where he first became a page in the queen's household, and later secured a commission in the Prussian army. In this relation he was ultimately obliged to face his compatriots under Napoleon, and was captured with his regiment. Notwithstanding the fact that Napoleon had made a rule that any Frenchman caught serving in the armies of his enemies should be shot, Chamisso escaped that fate and obtained permission to visit Paris. He had, indeed, solicited the German king to be released from service against his countrymen, but had been refused. He remained in Paris until peace was established, a condition that seems to be unexplained. He returned to Germany and took up the active study of botany, and in his thirty-first year was a student of medicine and natural science at the University of Berlin. He subsequently accompanied the ship "Rurik" for a three-years cruise around the world in the interest of natural science, the ship having been fitted out under the patronage

of the Tsar of Russia. Afterwards he became curator of the botanic garden at Berlin. One is reminded of the cruise of the "Beagle," but Chamisso's voyage did not yield the epoch-making results that Darwin's did.

Germans rank Chamisso as one of their great literary lights. Among his works is the story of Peter Schlemihl, based on German folk-lore, being the tale of the man who sold his shadow to the Devil. "Schloss Boncourt," "Salas y Gomez" and other of his works are familiar in literature. The story of Peter Schlemihl has been translated into several leading languages. It is somewhat remarkable that one born in France and with a long French ancestry should have acquired such a facility with the language of another country.

Chamisso's interest in botany was essentially limited to the systematic study of plants. He studied a large number, partly alone, partly in association with Schlechtendal, and published the results. Naturally, the collections he made on the "Rurik" voyage were the special object of his efforts. He established a number of genera and species. Two genera have been dedicated to him. Kunth separated some species of *Achyranthes* (Amarantaceæ), classifying them as *"Chamissoa,"* and Link established a genus of Onagraceæ under the title *"Chamissonia,"* which now contains about twenty species. In 1815-18, long before plant geography had been set apart as a distinct science, Chamisso made, as the result of journeys, many observations on the origin of the flora of the South Sea islands. He stated that these plants had been introduced from the Asiatic regions, although the American coast was nearer. On a journey in the Arctic region he remarked the dependence of the flora on the climate. He was attracted by the peculiar color of the sea water off the Brazilian coast and found that it is due to algæ. Ehrenberg has the honor usually of the discovery of this class of facts, but Chamisso was independently a discoverer. Chamisso's general interest was in plants and animals as manifestations of nature, and he did not give much thought to the philosophic or even the practical application of his knowledge. He was, however, not entirely uninterested in the practical side, as he wrote an essay on "The Useful and Injurious Plants of North Germany." He received the honorary degree of Ph. D. and at the instance of Humboldt was made a member of Academy of Sciences. He died in 1838.

Dr. Wächter calls attention to the curious fact that, unlike Goethe, Chamisso's two activities were not intermingled. From his

writings of natural history no one would glean that he was a poet, and from his poetical and prose contributions to general literature no one would infer an interest in botany. Only one partial exception to these statements is found, a bit of doggerel in which he sets forth his relations to natural history. It begins by allusion to a beetle, *Carabus chamissionis* Eschsch., upon which his name had been bestowed, and refers to the botanical genus, *Achyranthes,* from which Kunth had separated some species under the generic title *Chamissoa.* He ends the poem by saying that the real friend, whether emperor, king or noble, will be the one who gives him as a reward a good pension.

HENRY LEFFMANN.

SELECTED EDITORIAL

THE CENTENARY OF BENZENE.

June 16 was the hundredth anniversary of an epoch-making event, the opening of a new era of civilization. Yet it passed unnoticed by the multitude that enjoy its benefits. They went about their business and pleasure as usual; driving motor cars over roads made smooth by coal-tar and level by explosives; they listened to the music of the phonograph or radio; they wore gaily colored clothing, enjoyed pleasant perfumes and aromatic flavors and warded off disease by drugs and ointments without giving a thought of gratitude to the modest man who a hundred years before discovered the mother substance of these comforts, conveniences and luxuries of modern life, that is, benzene.

For this is one of the silent revolutions of science, originating in a most unspectacular event, plain Michael Faraday, the blacksmith's son, working in the basement laboratory of the Royal Institution in London, separating out from compressed oil gas a few drops of a clear colorless limpid liquid, giving no hint of the potent poisons, brilliant dyes, pungent scents and high explosives that are derived from it.

Benzene is a key compound, we may call it a key-ring compound, for when the chemist draws a diagram of its molecule on the blackboard he makes a ring or hexagon of six carbon atoms, holding

hands like half a dozen children playing ring-around-rosy. That is why it gives a chance for so many derivatives. The chemist can attach any kind of atom, or group of atoms, to any of the six carbons and while it makes no difference which of the six he attaches the first side-chain to, it does make a difference where he attaches later side-chains. The chemist has made about 150,000 compounds on the basis of the benzene ring in the century since Faraday discovered it, and he can make as many more if he needs them in his business. All these derivatives are distinct and different, as different as a cat and dog, or as a pot of poison and a pork pie. Most of them are novelties, creations of the chemist, not found in nature. The benzene compounds have added immeasurably to the wealth of the world, to the length of life and to the joy of living.

But the man who first made benzene died poor. He might have made half a million dollars or more if he had turned his talents to commercial work. But he preferred to be a pioneer, and he deliberately set aside the temptations of wealth and title, and devoted his life to the pursuit of pure science. His professional business income during the later and most fruitful years of his life ranged from $500 a year to zero.

Such a man, whose labors contribute to the enrichment of his country and the world at large, instead of to his own profit, should be supported by the nation, but when Faraday was persuaded to apply to the Government for a pension, so he could continue his researches in electricity and chemistry, Lord Melbourne, the prime minister, laughed at him and called him a humbug.

But the world knows him better now than did his rulers, and few will be disposed to dispute the judgment of his friend and collaborator, Tyndall, who said that "Michael Faraday was the greatest experimental philosopher that the world has ever seen."

Faraday announced his discovery of benzene to the Royal Society of London on June 16, 1825, and on that date this year delegates of the chemical societies and chemical industries of Great Britain and the United States assembled at the Royal Institution at London to do honor to this great man and to appraise the value of his discovery to the world.

Dr. Edwin E. Slosson,
Washington, D. C.

Science Service.

ORIGINAL ARTICLES

A PHYSICO-CHEMICAL STUDY OF U. S. P. AGAR.

Ellery H. Harvey.

In a previous paper [1] the writer described the technic used in an attempt to secure ash-free agar by electro-dialysis. The work reported below continues the study of agar but confines itself to the original shredded U. S. P. material. This had a moisture content of 21.36 per cent., ash 3.75 per cent. on a moisture-free basis and a pH of 4.05 in a hot 1 per cent. solution.

Heat of Combustion.

This determination was made on bone-dry agar, using a Parr Bomb Calorimeter. The average value of several experiments was 4870 calories per gram.

Effect of Boiling on the Viscosity of Agar Sols.

A 1 per cent. agar sol was prepared, boiled for definite periods, evaporation losses made up and the viscosity determined in an Ostwald pipette immersed in a thermostat at 45 degrees C. The results are relative to water at the same temperature. It is evident from the data in Table 1 that boiling hydrolyzes the agar, lowering the viscosity and destroying the ability of the agar to gel.

TABLE 1.

Treatment	*Relative Viscosity at 45° C.*
Just brought to a boil	1.16
Boiled 5 minutes	1.09
Boiled 10 minutes	1.06
Boiled 15 minutes	1.05
Boiled 20 minutes	1.044
Boiled 25 minutes	1.04
Boiled 30 minutes	1.035

[1] *Amer. Jour. Pharm.*, 97, 66-70 (1925).

Optical Activity.

Several dilute, hot agar sols gave no evidence of possessing optical activity when examined in a polariscope.

Heat of Imbibition.

When dry materials as gelatin, starch, etc., are added to water, they swell and heat is evolved. Weighed amounts of agar, after being held in a thermostat, were added to definite weights of distilled water at the same temperature as the agar, held in a silvered Dewar flask. The rise in temperature was noted on a Beckmann thermometer and the calories of heat evolved per gram calculated. The average value of five determinations was 2.7. Quantitative measurements of the heat evolved when gels take up water have been made by Wiedemann and Ludeking [2] and also by Rodewald.[3]

Adsorption.

Three grams of finely cut agar were weighed into each of six flasks and treated for twenty minutes as follows:

(1) 100 cc. n/2 acetic acid;
(2) 80 cc. n/2 acetic acid and 20 cc. water;
(3) 60 cc. n/2 acetic acid and 40 cc. water;
(4) 40 cc. n/2 acetic acid and 60 cc. water;
(5) 20 cc. n/2 acetic acid and 80 cc. water;
(6) 10 cc. n/2 acetic acid and 90 cc. water.

Ten cc. of the acid solution from each flask was then titrated with n/10 NaOH. The results are tabulated in Table 2.

TABLE 2.

Flask.	*1*	*2*	*3*	*4*	*5*	*6*
10 c. of original solution require in cc. of n/10 NaOH	51.42	41.42	31.42	21.42	11.42	5.14
10 cc. of solution after shaking require in cc. of n/10 NaOH (c)	49.52	39.75	29.97	20.17	10.39	4.43

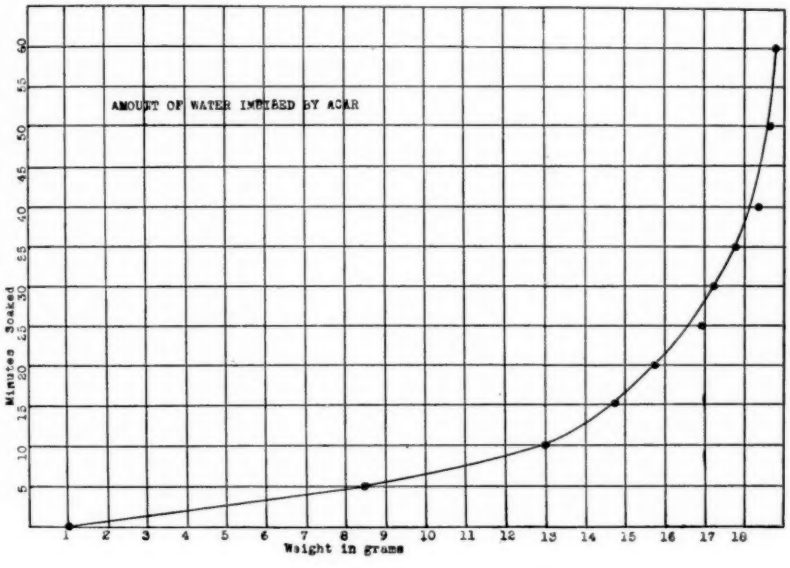
[2] *Wied. Ann.*, 25, 145 (1885).
[3] *Zeit. phys. Chem.*, 24, 206 (1897).

Flask.	*1*	*2*	*3*	*4*	*5*	*6*
Amount of acid adsorbed in cc. of n/10 NaOH (x)	1.90	1.67	1.45	1.25	1.03	0.71

If the results are plotted, (c) being abscissas and (x) being ordinates, a smooth parabolic curve is obtained. Adsorption is therefore relatively greater from dilute solutions than from more concentrated solutions.

Amount of Water Imbibed by Agar While Swelling in Water.

One gram of agar was placed in a beaker, distilled water added and the agar allowed to soak. At stated intervals the agar was thrown on a tightly stretched cloth to drain for exactly one minute, and weighed. Table 3 gives the increase in weight, per five-minute intervals. The results are obviously but roughly quantitative but are fairly consistent and have a relative value. The results are plotted in Curve 1. It is evident that adsorption is comparatively rapid at first and then becomes slower. Hofmeister [4] has determined the rate at which gels imbibe water.



[4] *Arch. exp. Pathol. u. Pharmakol.*, 27, 395 (1890).

TABLE 3.

Minutes Soaked.	*Weight in Grams.*
0	1.00
5	8.46
10	13.00
15	14.75
20	15.80
25	16.95
30	17.25
35	17.81
40	18.36
45	18.41
50	18.65
55	18.70
60	18.74

Adsorption of Aqueous Vapor.

Five grams of agar were exposed above water in a container closed to the air, at a temperature of 21 degrees C. At frequent intervals the agar was weighed in a closed beaker and the gain in weight noted. The results obtained for the duration of the test are given in Table 4. The time in each case refers to the total elapsed time.

TABLE 4.

Original weight	5.0000 grams
30 minutes later	5.0096 "
1 hour later	5.0208 "
2 hours later	5.0344 "
3 hours later	5.0482 "
23 hours later	5.2804 "
27 hours later	5.3126 "
47 hours later	5.4616 "
72 hours later	5.6314 "
95 hours later	5.7564 "
5 days later	5.8734 "
6 days later	5.9658 "
7 days later	6.0688 "

8 days later	6.1448 grams
9 days later	6.2242 "
10 days later	6.2974 "
11 days later	6.3588 "
12 days later	6.4110 "
13 days later	6.4604 "
14 days later	6.5088 "
15 days later	6.5440 "
16 days later	6.5782 "
17 days later	6.6078 "
18 days later	6.6288 "
20 days later	6.6750 "
21 days later	6.6944 "

The Dehydration of Agar Gels.

One gram of agar was dissolved in 99 grams of distilled water by bringing to a boil and making up evaporation losses. This was poured on a cool glass plate and allowed to congeal in an ice box. The gel was cut into pieces about 2.5 x 7 cm.

One piece weighing 1.2530 grams was put into a drying oven until constant weight was obtained. Percentage of moisture, 99.2.

Another piece of agar gel weighing 1.1566 grams was placed in an enclosed atmosphere above concentrated sulphuric acid having a specific gravity of 1.825.

The gel was weighed every twenty-four hours, using a closed container, and the change in weight noted. From Table 5 it will be seen that the gel lost weight during the first forty-six hours and then gradually increased in weight until it became constant after five days.

TABLE 5.

Original weight	1.1566 grams
After 24 hours	0.0116 "
After 46 hours	0.0102 "
After 72 hours	0.0107 "
After 96 hours	0.0114 "
After 120 hours	0.0126 "
After 144 hours	0.0126 "
After 168 hours	0.0126 "

This gel was then transferred to an enclosed atmosphere above water at 21 degrees C. The gel during the first twenty-four hours took on moisture and then gradually lost it. This loss of weight when confined at an atmosphere of water vapor at 21 degrees C. is in harmony with the results set forth below on a separate determination.

TABLE 6.

After 12 days	0.1347 grams
After 24 hours	0.0332 "
After 48 hours	0.0320 "
After 72 hours	0.0306 "
After 96 hours	0.0285 "
After 120 hours	0.0266 "
After 144 hours	0.0249 "
After 168 hours	0.0226 "
After 8 days	0.0207 "
After 9 days	0.0190 "
After 10 days	0.0169 "
After 11 days	0.0148 "
After 12 days	0.0127 "

Another piece of gel weighing 1.0224 grams was placed in an atmosphere of water vapor at 21 degrees C. The gel gradually and consistently lost weight during the period of the test.

TABLE 7.

Original weight	1.0224 grams
After 24 hours	0.8844 "
After 46 hours	0.7800 "
After 72 hours	0.6920 "
After 96 hours	0.5974 "
After 120 hours	0.5124 "
After 144 hours	0.4554 "
After 168 hours	0.3880 "
After 8 days	0.3201 "
After 9 days	0.2754 "
After 10 days	0.2200 "
After 11 days	0.1793 "

After 12 days	0.1347	"
After 13 days	0.0814	"
After 14 days	0.0414	"
After 15 days	0.0321	"
After 16 days	0.0255	"
After 17 days	0.0204	"
After 18 days	0.0154	"

Specific Gravity.

The specific gravity of the original shredded agar was determined by using a bottle pycnometer in the usual manner. Owing to the enormous number of small air bubbles persistently held by the agar thorough evacuation is necessary. Duplicate determinations in distilled water and in xylene gave identical results when calculated to the same basis. At 21 degrees C. the average of four determinations was 0.7190.

Acknowledgment.

The work reported herein and that reported previously [5] was done in the Laboratory of Physical Chemistry, University of Wisconsin, Madison, Wisconsin.

References to Agar.

Anon.: Food value of vegetable gelatins. *J. Am. Med. Assoc.*, 48, 142 (1907).

C. A. Browne: Moisture absorptive power of agar. *J. Ind. Eng. Chem.*, 14, 712 (1922).

S. C. Bradford: Forces which hold agar in solution. *Biochem. J.*, 17, 230 (1923).

K. Charichkov: The pseudo-extraction of agar. *J. Russ. Phys. Chem. Soc.*, 52, 96 (1920).

C, L. Carey: The gross structure of an agar gel. *Bull. Torrey Botan. Club*, 48, 173 (1921).

J. Cunningham: Preparation of a purified agar powder. *Indian J. Med. Research*, 6, 560 (1919).

Cameron and Moore: Fertilizer Resources of the United States. *Senate Document*, 190 (1912).

S. Dokan: The action of electrolytes in the swelling of agar. *Kolloid-Z.*, 34, 155 (1924).

[5] Harvey: The Electro-dialysis of Agar. *Amer. Jour. Pharm.*, 97, 66 (1925).

Einhorn: Agar as an aid to intestinal therapeutics. *Berl. klin. Woch.*, 49, 113 (1912).

Jean Effront: The absorbent power of agar. *Compt. rend.*, 180, 29 (1925).

A. Fernau: Action of radium rays on agar. *Biochem. Z.*, 102, 246 (1920).

Fairbrother and Mastin: The swelling of agar. *J. Chem. Soc.*, 123, 1412 (1923).

A. W. Foster: Periodic precipitation. *Trans. Royal Soc. Canada*, 12, III, 55 (1918).

C. R. Fellers: The nutritive value of agar. *Pure Products*, 13, 177 (1917).

E. E. Free: Swelling of agar gels in solutions of sucrose and dextrose. *Science*, 46, 142 (1917).

E. H. Harvey: The electro-dialysis of agar. *Am. J. Pharm.*, 97, 66-70 (1925).

James Hendrick: The value of seaweeds as raw materials for the chemical industry. *J. S. C. I.*, 35, 565-74 (1916).

J. Hjort: Distribution of fat-soluble vitamins in marine animals and plants. *Proc. Roy. Soc.*, 93B, 440 (1922).

F. O. Hammerstein: Apparatus for drying agar. *Chem. App.*, 6, 105 (1919).

Herzfeld and Klinger: Preparation of pure agar. *Biochem. Z.*, 107, 268 (1920).

K. Heesch: Change of electrical charge on agar. *Arch. ges, Physiol. (Pflugers)*, 190, 198 (1921).

K. Iwase: Coagulation of agar hydrosol. *J. Tokyo Chem. Soc.*, 41, 468 (1920).

D. S. Jennings: Effect of agar on growth of wheat seedlings. *Soil Sci.*, 7, 201 (1919).

Klostermann: Protein-free agar. *Z. Hyg. Infektionskrankh.*, 94, 262 (1921).

Lohrisch: Utilization of agar by herbivora. *Zeit. f. exp. Path. u. Pharm.*, 5, 478 (1908).

D. Landsborough: *"British Seaweeds."* London, 1849.

Loeper, Barbarin and Verpy: Use of agar in dressing wounds. *Compt. rend. soc. biol.*, 79, 660 (1916).

R. E. Liesegang: Liquefaction of agar by calcium salts. *Farben-Ztg.*, 24, 971 (1919).

Mellons, Acree, Avery and Slagle: The washing of agar. *J. Infec. Dis.*, 29, 1 (1921).

H. S. Mitchell: Reproduction on "synthetic" diets when purified agar is added to the mixture. *Am. J. Physiol.*, 62, 557 (1922).

C. Matsuoka: Transparent agar product. *U. S. Pat.* 1,453,848 (May 1, 1923).

D. M. McCarthy: Jelly-like product of agar and formaldehyde. *U. S. Pat. Reissue* 14,514 (Aug. 27, 1918).

R. W. Mimford: Glue from agar. *Brit. Pat.* 134,011 (Oct. 21, 1918).

Mendel: Use of agar in chronic constipation. *Zentral. f. d. gesammte Phys. u. Path. des Stoffw.*, No. 17, 1 (1908).

Morse: Treatment of constipation in children. *J. Am. Med. Assoc.*, 55, 934 (1910).

D. T. MacDougal: Hydration tests with agar. *Proc. Am. Phil. Soc.*, 63, 76-93 (1924).

MacDougal and Spoehr: Effect of acids and salts on "biocolloid" agar. *Science*, 46, 269 (1917).

MacDougal and Spoehr: Effect of organic acids and their amino compounds on hydration of agar. *Proc. Soc. Exp. Biol. Med.*, 16, 33 (1918).

MacDougal and Spoehr: Swelling of agar in solutions of amino acids and related compounds. *Bot. Gaz.*, 70, 268 (1920).

D. T. MacDougal: The action of bases and salts on swelling of agar. *Proc. Am. Phil. Soc.*, 60, 15 (1921).

MacDougal and Spoehr: The solution and fixation accompanying swelling and drying of agar. *Plant World*, 22, 129 (1919).

Newcomb and Smythe: Notes on the moisture and ash content of agar. *J. Am. Pharm. Assoc.*, 10, 524 (1921).

Zae Northrup: New method of preparing cellulose for cellulose agar. *Abstracts Bact.*, 3, 7 (1919).

Neuberg and Ohle: The sulphur content of agar. *Biochem. Z.*, 125, 311 (1921).

H. A. Noyes: Filtration of agar. *Chem. Analyst*, 25, 12 (1918).

H. A. Noyes: Agar for bacteriological use. *Science*, 44, 797 (1916).

Novy and DeKruif: Agar anaphylatoxin. *J. Infect. Dis.*, 20, 536 (1917).

C. A. Pekelharing: The passage of pepsin across an agar jel. *Arch. intern. physiol.*, 18, 495 (1921).

Plauson and Vielle: Colloid powder of agar. *Brit. Pat.* 156,142 (Dec. 31, 1920).

A. Pijper: Liquid formed in mediums of agar. *S. African Med. Record*, 17, 372 (1919); *J. Am. Med. Assoc.*, 74, 767.

A. E. Parkes: The detection of agar. *Analyst*, 46, 239 (1921).

Pietrkowski: Electrolytes of Ringer solution. *Arch. exp. Path. Pharm.*, 85, 300 (1920).

Reinchild Chemical Co.: Phenolphthalein-Agar. *U. S. Pat.* 943,163 (Dec. 14, 1909).

H. M. Richards: Some edible seaweeds. *Science*, 21, 895 (1905).

M. A. Rakuzin: Action of agar on ammonium chloride. *Biochem. Z.*, 137, 349 (1923).

M. A. Rakuzin: The protein nature of agar. *J. Russ. Phys. Chem. Soc.*, 49, I, 164 (1917).

Walter Stiles: The penetration of sodium chloride into agar gels. containing silver nitrate. *Biochem. J.*, 14, 58 (1920).

Serger: Recovery of agar used for bacteriological purposes. *Pharm. Zentralhalle*, 57, 407 (1916).

Samec and Isajevic: Physiochemical analysis of agar gels. *Kolloidchem. Beihefte*, 16, 285 (1922).

Swartz: Digestibility of the various carbohydrates found in algae. *Conn. Acad. Arts Sciences*, 16, 249-382 (1911).

Luther Thompson: Changes in nutrient agar due to clarifying with egg. *J. Lab. Clin. Med.*, 7, 758 (1922).

F. W. Tiebackx: Suspensoid form of agar by dehydration with alcohol. *Pharm. Weekblad.*, 60, 76 (1923).

S. Tsuboi: Agar as an addition agent in the electroplating of lead. *J. Chem. Ind. Japan*, 21, 648 (1918).

F. A. Wolf: The preparation of agar for cultural purposes. *Tech. Bull. N. Car. Sta.*, No. 20, 44 (1921).

A STUDY OF THE INFLUENCE OF THE pH CONCENTRATION UPON THE STABILITY OF DIGITALIS INFUSION AND POTASSIUM CITRATE MIXTURES.*

Infusion of digitalis containing potassium citrate in solution is a preparation widely used as a diuretic. It is a well-known fact that such infusions show varying tendencies to deposit sediments and also vary somewhat in color when materials obtained from different sources are used. It was thought of interest to investigate the influence of the pH concentration on the stability of such infusions.

The pH of digitalis infusions made from different lots of leaves varies. Thus two infusions prepared from two different lots of leaves had pH values of 5.8 (sample No. 1), and 6.28 (sample No. 2), respectively. The 1ormer had a deeper color than the latter.

If to both infusions a definite quantity of potassium citrate, which reacts nearly neutral, is added, it is obvious that the behavior of the two mixtures, as far as it is influenced by the hydrogen ion concentration, cannot be the same. If, for instance, 5 cc. of a 10 per cent. citrate solution which has a pH value of 7.35, is added to 50 cc. of the first digitalis infusion, the resulting pH value of the mixture is 5.93. In other words, the mixture thus obtained is still more acid than the second digitalis infusion of pH 6.28.

On standing, these two digitalis infusions showed noticeable differences in behavior. Both samples, when kept in sealed ampoules, did not show any turbidity after fourteen days standing. On the other hand, when kept in containers closed by cork stoppers only, sample 1 showed a slight opalescence after nine days standing,

*A contribution by the Plaut Research Laboratory. Lehn & Fink, Inc., Bloomfield, N. J.

whereas sample 2 was opalescent after three days and considerably turbid after seven days standing.

In order to make the addition of citrate of definite acidity to the digitalis infusions possible, citrate solutions of various concentrations and pH values were prepared.

A 10 per cent. solution of our stock potassium citrate (U. S. P.) had a pH of 7.35. A 50 per cent. solution of the same salt had a pH of 7.57.

For the purposes of the investigation a 50 per cent. solution of the citrate was found to be more suitable than a 10 per cent. solution. The latter showed, after ten days standing a remarkable formation of mould, similar to shreds of paper fiber. The 50 per cent. solutions were much more stable, showing only a scarcely visible turbidity.

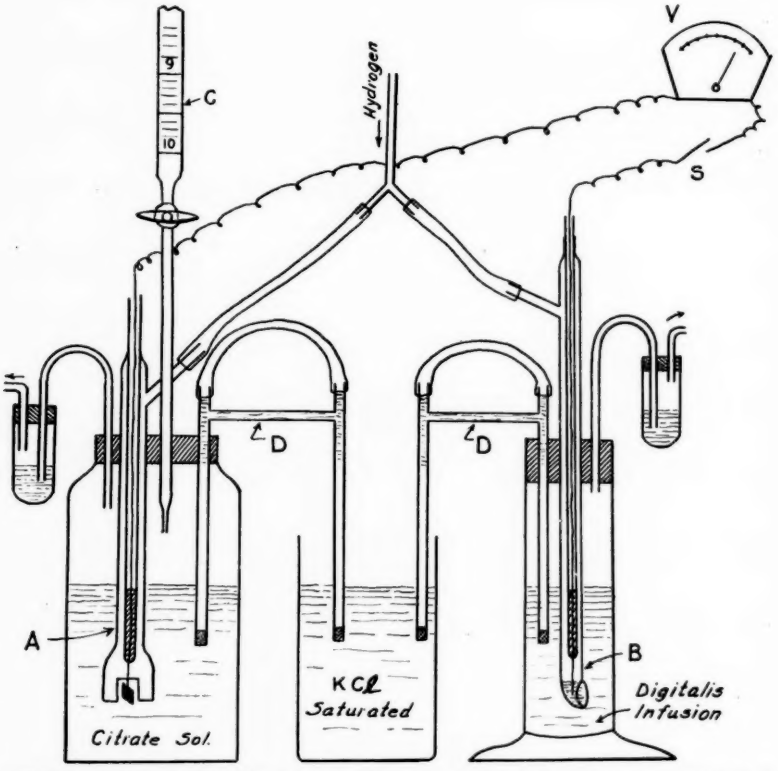
In citrate solutions of equal concentrations, the formation of moulds was found to vary with different hydrogen ion concentrations of the solutions. Of ten solutions examined having pH 5.0, 6.22, 6.40, 6.95, 7.16, 7.35, 7.55, 7.90, 9.12 and 10.58, the citrate with pH 5.0 showed the most noticeable formation of mould. Solutions with pH values 6.95, 7.16, 7.35 and 7.55 which were about neutral, contained decidedly less mould growth, while solutions with pH 9.12 showed again a strong mould growth. The most alkaline solution No. 10 (pH—10.58) was nearly clear. The mould in question belonged to the genus *penicillium*.

The fact that both of the two components are liable to become turbid either by decomposition or by formation of mould, complicates the study of the behavior of their mixtures.

A number of samples to which solid citrate was added instead of the solution of the salt, did not show any difference in behavior as compared with mixtures which were prepared by addition of solutions of equal quantities of the same citrate, provided the citrate solutions were freshly prepared. It was found more convenient, however, to use the solution of the salt.

The original color of digitalis infusion is more or less deepened by the addition of potassium citrate. This difference in color is due primarily to a change in hydrogen ion concentration of the infusion. If to the digitalis infusion we add hydrochloric acid in increasing quantities, the color becomes lighter. It can be restored and even deepened by the addition of potassium hydroxide. In this respect

the digitalis infusion shows the properties of an indicator. Citrate solutions of definite hydrogen ion concentration were prepared by adding strong hydrochloric acid (1:3) or diluted potassium hydroxide (half normal) to the citrate solution until the potentiometer showed a definite potential between the hydrogen electrode immersed in the citrate solution and the calomel comparison electrode.



A—Hydrogen electrode (Hildebrand). B—Hydrogen electrode (Bunker). C—Burette 10 cc. D—Syphons filled with KCl saturated solution. V—High-resistance millivoltmeter.

In Fig. 1 is shown the arrangement which can be used when potassium citrate of the pH value equal to that of the digitalis has to be prepared. In this case the potentiometer is not necessary and the calomel electrode can be substituted by the hydrogen elcctrode B, which is filled with digitalis infusion. Hydrochloric acid is added from the 10 cc. burette C until the high-resistance millivoltmeter V gives no deflection on tapping the key S.

The fact that a mixture of lighter color can be obtained by ad-

dition of a citrate which does not diminish the original hydrogen ion concentration of the digitalis infusion, is of interest. The quantity of acid citrate which can be added without causing any decomposition of the digitalis infusion is smaller than when a citrate of neutral or alkaline reaction is added. Nevertheless, if the quantity of the citrate does not exceed one gram in 50 cc. of the infusion, acid citrate (of the same acidity or even somewhat more acid than the digitalis itself) can be used without causing any precipitate by decomposition of digitalis infusion.

Table I shows the behavior of a number of mixtures of this kind. The citrate was added in form of a 50 per cent. solution of the pH value—5.6. The pH value of the infusion was 5.8, *i. e.*, the citrate was somewhat more acid than the digitalis.

TABLE I.

Sample	*Citrate Added to 50 cc. Digitalis*	*Behavior of the Mixture*
1	0.5 grammes	Clear after 7 days standing
2	1.0 "	" " " " "
3	1.5 "	Opalescence after 4 days
4	2. "	Turbid after 1 day
5	2.5 "	Precipitate after a few hours

It is necessary to discriminate between two kinds of deposits in digitalis infusion-citrate mixtures. The one consists of the formation of a number of scarcely visible particles (similar to those which are formed in potassium citrate solutions on standing). The mixture itself does not look opalescent or turbid. The other kind of deposit imparts to the mixture a strongly opalescent or turbid appearance, and forms a considerable precipitate by decomposition of the digitalis.

The first kind of deposit occurs in nearly all the digitalis-citrate mixtures if they stand more than a week. It is independent of the amount of citrate added. As it does not appear in comparatively fresh solutions and only in very small quantities, it was not regarded of particular interest in this investigation.

The second kind of deposit, which imparts to the solution an opalescent or turbid appearance, generally develops a few hours or days after the addition of the citrate. The solution apparently undergoes a decomposition and is not suitable for sale.

A number of experiments were carried out in order to determine the maximum quantity and the most suitable hydrogen ion con-

centration of the citrate to be used, without causing any turbidity and precipitation. Some of the results are recorded in tables II and III. The mixtures in table II were prepared with digitalis infusion of pH 5.8, those in table II with digitalis infusion of pH 6.28. The citrate was added as a 50 per cent. solution.

TABLE II (DIGITALIS I; pH = 5.8).

	Citrate added to 50 cc.		*Appearance of the Mixtures after*		
Sample	*Quantity*	*pH Value*	*1 day*	*4 days*	*7 days*
14	2.5 gr.	10	Turbid	Turbid	Turbid
15a	0.5 "	5.8	Clear	Clear	Clear
b	1.0 "	"	"	"	Slightly opal.
c	1.5 "	"	"	Slightly opal.	" "
d	2.0 "	"	Opalescent	Turbid	Turbid
e	2.5 "	"	Turbid	"	"
16a	0.5 gr.	7.57	Clear	Clear	Clear
b	1.0 "	"	"	"	"
c	1.5 "	"	"	"	"
d	2.0 "	"	"	"	Opalescent
e	2.5 "	"	Opalescent	Turbid	Turbid

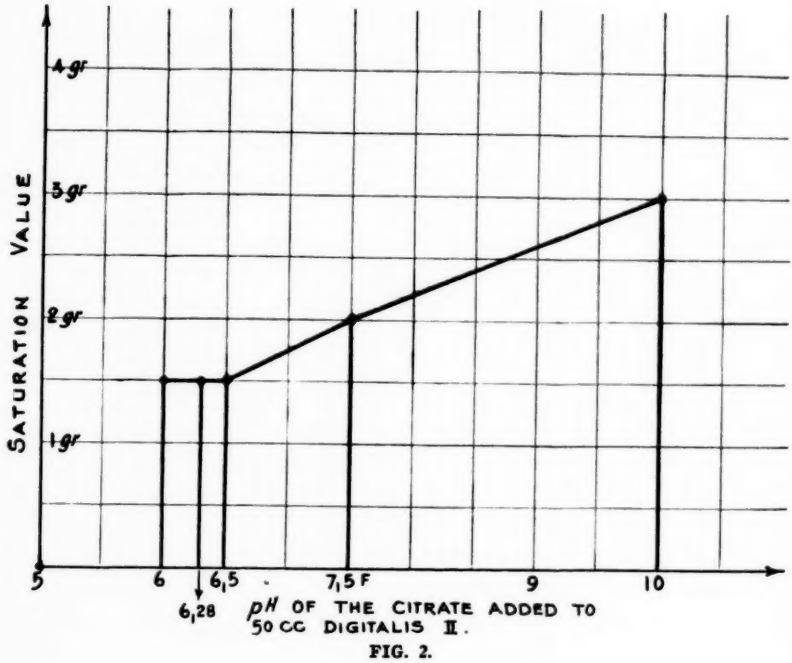


FIG. 2.

If corresponding samples in both tables are compared, *i. e.*, samples to which citrate in equal quantities and of the same hydrogen ion concentration has been added, it will be seen that the two digitalis infusions do not behave in exactly the same way with regard to the maximum quantity of citrate which can be added without causing any turbidity of the infusion. This maximum quantity can be called the "saturation-value" of the infusion.

The dependence of the saturation-value on the hydrogen ion concentration can be seen very clearly from table III or figure 2.

The ordinates in figure 2 denote saturation values after seven days standing, the abscissas the pH values of the citrates.

The tables II and III as well as figure 2 show that the saturation value increases with increasing pH value of the citrate. Three grams of a citrate of pH-10 could be added to 50 cc. of digitalis infusion without causing any turbidity in the course of one week, while the corresponding quantity was only 1.5 to 2 grams where stock potassum citrate (U. S. P.) was used. The permissible quantity is still smaller for a citrate which, by addition of hydrochloric acid, was brought to about the same acidity as the digitalis infusion.

The digitalis infusion does not become remarkably alkaline by addition of moderate quantities of a 50 per cent. citrate solution with a pH-10, as might be anticipated. Different mixtures showed the following pH values:

TABLE III (DIGITALIS II; pH = 6.28).

	Citrate added to 50 cc.		*Appearance of the Mixtures after*		
Sample	*Quantity*	*pH Value*	*1 day*	*4 days*	*7 days*
18a	0.5 gr.	5.95	Clear	Clear	Clear
b	1.0 "	"	"	"	"
c	1.5 "	"	"	"	"
d	2.0 "	"	Slight opal.	Strong opal.	Turbid
19a	0.5 gr.	6.28	Clear	Clear	Clear
b	1.0 "	"	"	"	"
c	1.5 "	"	"	"	"
d	2.0 "	"	Slight opal.	Opalescence	Strong opal.
e	2.5 "	"	Turbid	Turbid	Turbid
20a	0.5 gr.	6.5	Clear	Clear	Clear
b	1.0 "	"	"	"	"
c	1.5 "	"	"	"	"
d	2.0 "	"	"	Slight opal.	Slight opal.
e	2.5 "	"	Opalescent	Turbid	Turbid
f	3.0 "	"	Turbid	"	"

Sample	*Citrate added to 50 cc.* *Quantity*	*pH Value*	*Appearance of the Mixtures after* *1 day*	*4 days*	*7 days*
21a	0.5 gr.	7.57	Clear	Clear	Clear
b	1.0 "	" (Stock	"	"	"
c	1.5 "	" citrate)	"	"	"
d	2.0 "	"	"	"	"
e	2.5 "	"	Slight opal.	Opalescence	Opalescent
f	3.0 "	"	Turbid	Turbid	Turbid
22a	0.5 gr.	10.0	Clear	Clear	Clear
b	1.0 "	"	"	"	"
c	1.5 "	"	"	"	"
d	2.0 "	"	"	"	"
e	2.5 "	"	"	"	"
f	3.0 "	"	"	"	"
g	3.5 "	"	Opalescence	Turbid	Turbid

TABLE IV.

Sample	*Citrate of pH = 10 Added to 50 cc. Digitalis II*	*Resulting pH Value (of the Mixture)*
22a	0.5 grams	6.75
b	1.0 "	6.9
c	1.5 "	7.02
d	2.0 "	7.11
e	2.5 "	7.18

Table IV shows that the mixtures of digitalis and citrate solutions of pH-10 react nearly neutral. Of course the pH values increase with increasing quantities of citrate added.

Summary.

1. Digitalis infusions show an acid reaction of varying pH value depending on the quality of the leaves used.
Potassium citrate (U. S. P.) reacts either nearly neutral, or slightly alkaline (pH about 7.3 in 10 per cent. solution).
The mixtures of digitalis infusion and U. S. P. potassium citrate react acid (pH about 6).
2. The maximum quantity of potassium citrate which can be added to a digitalis infusion without causing any turbidity ("saturation value") depends on the hydrogen ion concentration of the citrate. This saturation value increases with increasing alkalinity of the citrate. Three grams of a ci-

trate of pH-10 in 50 per cent. solution could be added to 50 cc. of digitalis infusion without causing any decomposition within a week. Mixtures of this kind react nearly neutral.

The amount of stock U. S. P. potassium citrate which could be added without causing decomposition was only 1.5 to 2 grams. This quantity is still smaller if the citrate, by addition of hydrochloric acid, was brought to about the same acidity as that of the digitalis infusion.

3. To prepare a digitalis-citrate mixture of high stability and concentration it is necessary that a neutral mixture results. The quantity of potassium hydroxide which must be added either to the citrate or to the mixture to accomplish this can easily be determined electrometrically. The color of such a mixture is somewhat darker than that of the digitalis infusion itself, but this deepening of color always occurs when potassium citrate is added to digitalis.
4. If a light colored mixture is wanted, the citrate has to be acidulated until it reacts somewhat more acid than the digitalis itself. Mixtures of this kind are stable for a week or more, but only if they do not contain more than one gram of citrate in 50 cc. infusion. Formation of mould takes place more easily in acid than in neutral mixtures.
5. Potassium citrate exerts a preservative action on digitalis infusions. Digitalis infusions may become opalescent or even turbid when they are standing for some days, while their mixtures with citrate of suitable concentration and pH value remain perfectly clear.

THE TANNIN OF RHUS GLABRA.*

By Josiah C. and Bertha L. DeG. Peacock.

The title "Rhus Glabra," previously used by the United States Pharmacopœia to designate the fruit of that plant, is now employed for the same purpose in the National Formulary by which authority the drug is recognized.

*Read before Pennsylvania Pharmaceutical Association, Washington, Pa., Meeting June 16, 17 and 18, 1925.

That Rhus glabra contains an astringent principle—a tannin—has long been known and on the recognition of this quality it has found use.

This drug has been the subject of several investigations, reference to which were given by Henry Kraemer in AMERICAN JOURNAL OF PHARMACY for September, 1913, in an article explaining that in commerce the fruit of Rhus glabra was being replaced by the fruit of Rhus typhina, and, in which paper, besides summarizing the reports of those who had contributed to an understanding of the constituents, he gave means for distinguishing these fruits by examining their hairs under the microscope.

As mentioned by Kraemer, Watson in 1853 (AMER. JOUR. PHAR., p. 193) published the results of his examination of the fruit of Rhus glabra, substantiating earlier statements by Cozzens and Rogers, the first of whom was concerned chiefly with establishing the presence of gallic and malic acids, while the latter pertained more to determining the form in which the malic acid occurs.

It is mainly on the statements of Watson that the references to the constituents of Rhus glabra found in the books which American pharmacists study and consult are based.

The experiments of Stenhouse, to which Kraemer referred, were not made on Rhus glabra nor on any other of the species of Rhus dealt with by Kraemer, but on what is known in the leather industry as "sumac," which is the ground leaves and twigs of Rhus coriaria, obtained usually from Southern Europe.

While from that date the belief that the tannin of this drug is gallotannic acid has not only held but has been strengthened, as, for instance, by the work of Trimble in 1892 and 1894 (reported by J. C. P. in AMER. JOUR. PHAR., 1900, p. 334), still until now the tannin of the fruit of this particular species has not to our knowledge been isolated and purified as a means of studying it apart from its association with other constituents of the drug always present in the decoctions and only by use of which Rhus glabra has heretofore been observed.

This tannin has engaged our attention for some years past; there has long existed the desirability of knowing more definitely its nature and thereby supplementing the results of Trimble's work which showed by ultimate analysis and otherwise that the tannin in the several plant parts of the related species investigated by him

is gallotannic acid. Again, in the exigencies of some recent work on the iron-greening factor of digitalis, it occurred that Rhus glabra might afford opportunity for studying the isolation and purification of a tannin associated with crystalline acid substance; and, since the presence of some crystallizable acids or of caffeine has been found by us to militate against the securing of tannins in porous or "puffed" condition, there was the thought that possibly experience might be gained with Rhus glabra which would be helpful in further consideration of the digitalis problem reported to this association a year ago.

To find a solvent, or means, that will select either the tannin or the crystallizable substance and thereby enable separation is, in every such instance, obviously necessary as the only hope of effecting the purification of the tannin.

In this report, we confine our consideration almost entirely to the tannin, giving outlines of the methods used to isolate and purify it; but, because of the intimate interest which directs attention to gallic acid, the matter of its presence in sumach berries has been given thought, for some of the reference books used by American pharmacists do not mention gallic acid as present.

The drug used for this work was taken from a market lot. After maceration of a portion in glycerin for twenty-four hours, it was compared microscopically with Kraemer's drawings of the hairs of the fruits of the species glabra, typhina and glabra borealis and found to be both genuine and unmixed.

The sensible properties of a decoction of sumach berries and its behavior toward iron test solutions, while well known, are mentioned in order to contrast certain effects which were noted in this work.

A rich red, freshly prepared, 10 per cent. decoction gave with ferric chloride test solution a strong bluish-black color and precipitate, that upon addition of an excess of the reagent became greenish-black. With gelatin solution, the decoction produced an abundant pinkish or deep flesh-colored precipitate; and with lead acetate a drab precipitate.

In contrast with these effects, when another portion of the same decoction was mixed with enough well-washed rasped rawhide to give a jelly-like consistency, and this mixture was allowed to stand for two hours, the expressed liquid, after filtration, was found to be colorless, free from astringent taste, to give but a slight,

if any, color with ferric chloride or ferric acetate solution beyond that of the reagent itself, and no precipitate with gelatin solution.

When this experiment was repeated, keeping the decoction in contact with the hide for but one hour, the result was the same. It was then found that, as soon as the color had been absorbed by the hide, the behavior of the filtered liquid toward ferric compounds and the other reagents was as stated for the two-hour contact.

Because of the absence of a reaction by the hide-treated decoction with ferric chloride and ferric acetate, there is reason to believe that gallic acid is not present in more than a minute amount, if at all. Furthermore, realizing that such small amounts might have been absorbed, the experiments were repeated, using decoctions to which trifling quantities of gallic acid had been added. In every such instance, the filtered liquid from the hide treatment gave the characteristic blue color for gallic acid with both ferric chloride and ferric acetate, and, by comparison with a water solution of the same strength of galli acid, no diminution of intensity of color reaction was manifested to indicate that any gallic acid originally present in the decoction had been removed by the hide.

When some of this same lot of decoction was allowed to stand for several days, by which time it usually became moldy, and was then treated with hide in the same way, the filtered liquid immediately showed the characteristic blue color with ferric chloride and ferric acetate indicating gallic acid and suggesting its presence as an alteration product of the tannin. (When the description of Watson's isolation and recognition of gallic acid in Rhus glabra is read with definite knowledge of the tannin and acid constituents of Rhus glabra, it is plainly evident that the latter furnished the crystalline form and the former the color reaction with iron salts; from which two observations he inferred the presence of gallic acid in accordance with earlier writers on this drug.)

But repetitions of this experiment with different lots of decoction showed no constancy in either the production or the amount of gallic acid.

Therefore, contrary to some authorities, it would seem that gallic acid is not a constant, if indeed ever a considerable, constituent of sumach berries, although it may at times be found in decoctions which have stood for several days.

In all of the filtered liquids from the hide treatments, there was acidity markedly demonstrable with litmus paper, and these liq-

uids still gave precipitates with lead acetate, although now white and of much less amount.

All but 3 per cent. of the titratable acidity of the decoction was retained by the hide.

The absorption of malic acid by hide was mentioned by Trimble, where cited and in same for 1903, page 343 (reported for him by William E. Ridenour).

Turning now to the isolation and purification of the tannin, trials were made on small lots of sumach berries using for each an equal portion of the drug. Decoction with water and percolations with ether and acetic ether were the three variations of these efforts. These three solvents removed substance other than tannin; all took out the tannin about equally well, but none gave more than a small yield.

When ether or acetic ether was used on the drug, fat was extracted, but it was readily got rid of by evaporating these solvents and treating the residue with water, pulping with paper and filtering. Also, small quantities of matter suggesting resin were thus removed, with production of brilliant solutions which could be diluted with water without producing turbidity.

Solutions of gallotannic acid, if not too dilute, form with ether a milky turbidity that soon becomes droplets which coalesce and settle as a subnatant layer. This formation approximates a saturated solution of the tannin in water-saturated ether. This behavior, which has not been observed with any other tannin and is therefore regarded as peculiarly characteristic of gallotannic acid, was soon noted as an attribute of the tannin of Rhus glabra. As long ago as 1837, advantage was taken of this behavior by Pelouzé as a step in the preparation of commercial gallotannic acid from galls. We made use of it in this work, but with little, if any, benefit through it serving to separate other constituents; a supernatant layer of ether, or ether quickly applied to the "puffed" tannin in process of purification, seemed as hereinafter mentioned in detail, much more effective in that capacity as evidenced by the relative amounts of non-tannin which were removed. And following such method of purification, shaking out from a water solution with acetic ether was done to obtain the tannin in "puffed" or porous form.

When ether is applied to porous Rhus glabra tannin, even when quickly done, the tannin at first acts as though it would not be soluble, but soon the rapidly evaporating ether has brought about con-

densation of sufficient moisture from the atmosphere to change this aspect, and solution becomes unmistakably evident, with eventual fulfillment of this tendency; in actuality this behavior is nothing more or less than the properties recognized and utilized by Pelouzé, merely somewhat differently induced.

Neither chloroform nor benzol applied to either the porous crude tannin or its solution in water were helpful as purifying agents.

Extraction of the fruit with hot water, concentration of the resulting extract and shaking out of this liquid with acetic ether as the primary process for securing the crude tannin was decided upon as the method to be applied to a two kilo. lot of the drug. And thus obtained from the concentrated decoction, the crude tannin was purified by the processes already outlined and as follows: repeated solution of the substance in water, dilution to a degree that permitted the aqueous liquid to be shaken with ether without formation of a water-ether-tannin layer, and subsequent removal of the tannin from the water solution by agitation with acetic ether. These several treatments were repeated until all appreciable non-tannin had been removed and the color, texture and solubility in water of the tannin seemed constant.

With the non-tannin, some tannin always went, so that the purification was a wasteful method, although in other respects quite satisfactory. Nowhere in these processes was evidence of gallic acid revealed.

The specimen of tannin from Rhus glabra that is shown to this meeting represents as high a degree of purity as was attained. Except for a tendency toward tan color, the properties of this tannin are those recited by the United States Pharmacopœia as requirements for the official tannin or gallotannic acid; for otherwise it complies, in form, odor, taste, solubilities, acidity and miscibility of aqueous solution, behavior toward ferric chloride, gelatin, albumen, starch and alkaloids, limit of moisture, and freedom from nonvolatile matter, to the text of the Pharmacopœia; which may therefore be taken as description of the tannin of Rhus glabra.

This tint of tan is not native to the gallotannic acid of commerce which comes from material devoid of red coloring, but which frequently bears a tinge of the green incident to its source.

But whether this tan color is or is not due to the red color of the drug is a question that has not been settled. Bearing upon the

matter, it is noteworthy that this color tends to remain in the mother-liquor as the tannin is reclaimed from solvents through evaporation of these by distillation, even under reduced pressure; also, that during these processes, up to the point of moderate concentration there appears on the flask at the edge of the boiling liquid a porous, almost snow-white, residue as the first portion of the tannin to separate from the lessening bulk. But, without interruption, the evaporation of the solvent must be carried to completion in vacuo in order to get a porous or even a dry product; since, otherwise, upon admission of air to the flask, the vapor of the solvent condenses to liquid and immediately dissolves the white mass of tannin. There appears to be no simple way to get a dry and permanent tannin except to sacrifice this whiteness, which, for its duration at least, indicates a tannin of commensurate purity; for with the volatilization of the last of the solvent, the red color, which until then has kept to the mother-liquor, instantly spreads throughout the entire contents of the vacuum flask. Inferentially, there is at least that much reason to regard the tannin of Rhus glabra as white, which is typical of a state of purity to which gallotannic acid has been brought by others and ourselves.

That this tendency to redden is not due to formation of a phlobaphene was several times demonstrated by use of mineral and vegetable acids on appreciable amounts of the tannin. It is our impression that this tinge of red will be traced to the same coloring in the drug.

Under the effect of diluted sulphuric acid, as in the customary process of preparing gallic acid from gallotannic acid, the tannin of Rhus glabra yielded a white, crystalline, acid substance in interlaced needles that responded to tests characteristic of gallic acid. (A small sample of the gallic acid thus made is exhibited.)

In view of the properties exhibited by this tannin it must be regarded as gallotannic acid, which Trimble showed to be the tannin in the several plant parts of the closely related species of Rhus that he investigated.

That conclusion having been reached, and freshly prepared decoctions having failed to show gallic acid, it was decided to subject some of the decoction to dialysis, primarily to learn whether the crystalline, vegetable acid substances present in the drug might have an exosmotic effect on the tannin, and, secondarily, as a further test for any gallic acid possibly existent in the drug.

Accordingly, a portion of 10 per cent. decoction was placed on a septum, and after twelve hours the outside liquid was tested with ferric chloride and ferric acetate, neither of which showed more than a faint green color in the liquid; but these tests upon addition of a drop of a weak solution of gallic acid gave at once the characteristic blue color. The liquid on the diaphragm had retained its strong reaction to these iron compounds. The outer liquid was already acid to litmus, showing that the crystalloid acids of the drug were diffusing through the membrane, and the successive lots of this liquid exhibited acidity up to the last portion, which was free from acid reaction to litmus. This examination with ferric salts and litmus was made every twelve hours; and at the end of eighty-four hours, the characteristic blue color reaction of gallic acid was, for the first, observable, also the liquid was without clouding effect on gelatin solution. The fluid on the membrane still possessed semblances of the decoction which it represented, including an ability to precipitate gelatin solution.

The next thirty-six hours revealed an increase in this evidence of gallic acid formation from the tannin, and then a decrease, until a test made at the end of five days and twelve hours proved that no more gallic acid was passing. At this juncture, examination of the fluid on the septum found it to be without iron-bluing effect, although at once coagulated by either iron chloride or iron acetate solution.

This residuum was without the acidity to litmus and the astringent taste which marked the decoction, and it had lost practically all of the original red color.

Repetitions of this experiment gave the same final result, but varied greatly in the length of time required for both the initiation and the progress to completion of the change to gallic acid.

These experiments proved to be unusually interesting, as they quite conclusively explain the occurrence of any gallic acid found in decoctions and other aqueous preparations of this drug. These experiments also show that gallotannic acid is not conducted through the septum by the crystalline acid substances associated with it in Rhus glabra; in these instances, it changed to gallic acid, which passed through as crystalloids normally do.

It is therefore plain to be seen that gallic acid may sometimes be present in Rhus glabra, since it is possible of derivation from the tannin through changes likely to occur in the drying or curing of this

drug; but, if present as such result, it will probably be in very minute amount. And for these reasons, statements of its presence should be qualified accordingly.

These dialytic experiments were made also on weak solutions of purified Rhus glabra tannin, and of a purified sample of commercial gallotannic acid, but without crystalline acids. The results were concordant in so far as the tannin from either source was concerned, both paralleling the behaviors noted for the decoction, with variations in time required for the change to gallic acid and its diffusion.

Finally, though this investigation of the tannin of Rhus glabra has shed but little light on the digitalis problem to which reference has been made, the isolation and purification of the tannin have added something of certainty to our understanding of this constituent and of its deportment in aqueous solution, by definitely confirming what until now was but the assumption that this tannin is gallotannic acid. And, to that extent, when such astringent is needed and circumstances permit, this knowledge justifies the present-day inclination to use official tannin in definite amount for dependable activity, instead of decoctions of drugs of the uncertain strength that attaches to sumach berries. If wanted, malic, citric or tartaric acids may be added to such tannin solution to give it the acidulous palatability that is so commonly stated as an advantage to be had from Rhus glabra; and a pleasing color may be imparted with suitable tinctorial substance. With such dispensing ability available to the physician, there seems to be neither need nor good reason for employing Rhus glabra.

BACILLUS ACIDOPHILUS PREPARATIONS.*

By Josiah C. Peacock.

It is not the purpose of this paper to deal with the bacteriology or chemistry of this subject; but since pharmacists are now called on to supply a variety of preparations containing bacillus acidophilus, a cursory review of the development of the several products seems opportune.

*Read before the 1925 meeting of the Pennsylvania Pharmaceutical Association.

While the indication for use of these preparations is a matter entirely for the physician to determine, the pharmacist is depended upon to supply them when wanted.

Bacillus acidophilus therapy has come as the result of the study of the theory of the lactic bacillary treatment of the digestive tract as propounded by Metchnikoff. Its fundamental principle is the same as that of his theory—to plant or inoculate the alimentary with an innocuous organism to the exclusion of harmful bacteria, such as Bacillus coli and other proteolyzing organisms.

In the last years of Metchnikoff's labor and life, a veritable wave of "sour milk" swept this country and was swallowed in the hope, if not belief, that it would defer old age and prolong life. During that period, "buttermilk" was the popular embodiment of the virtues of Metchnikoff's theory; but the bacteriologist meanwhile discerningly sought to get at the actual value of this thought by offering pure whey cultures and compressed tablets of Bacillus bulgaricus and otherwise testing the hypothesis that this organism was both proficient and sufficient for the purpose.

Although at first encouraged by the apparent success which attended the administration of bulgarian bacillus, the disciples of Metchnikoff and others who were studying the subject eventually learned that this organism with which they worked could not be permanently implanted in the intestine nor acclimated thereto, and therefore can be maintained therein only by continuous administration.

In the study of this matter, some workers having turned to an observation of the primordial intestinal flora of the mammals found new organisms, and these soon thereafter were detected also in subjects which had been regarded as under unmixed bulgarian bacillus treatment. Further study of the newly-found organisms revealed among other things that one of them was particularly well suited for propagation in the intestine. Because of the acid (lactic) tolerating faculty of this newly-recognized organism, it was named Bacillus acidophilus, that is, "acid loving" bacillus, or, more specifically, acid enduring (aciduric) bacillus. Its resemblance to the bulgarian bacillus had allowed it to be overlooked, and like the bulgarian it is nonmotile.

It was now that, with the recognition of Bacillus acidophilus as the predominant organism in the feces of the new-born infant and

of the unweaned calf, the theory of Metchnikoff was again crystallized in the assumption and assertion that what benefit had been found from the use of bulgarian bacillus was really due to the presence of this bacillus acidophilus; and medicine promptly turned to bacteriology for this organism—the rational treatment, because obviously a biologic defender of the alimentary tract. There is powerful psychology in such knowledge; and the whey culture and tablet forms in which the bulgarian bacillus had been offered were at once resorted to for the administration of bacillus acidophilus.

A comprehensive summary of this development of bacillus acidophilus therapy is accessible in "A Treatise on the Transformation of the Intestinal Flora with Special Reference to the Implantation of Bacillus Acidophilus," which was published in 1921 by Rettger and Cheplin.

The ingestion of enormous amounts of B. acidophilus having proved its entire harmlessness, the value of mass inoculation was early advocated; and, with the food feature of milk for young and old so outstanding, "acidophilus milk" was intuitively regarded as both an attractive and efficient medium for administration.

Under strict bacteriologic technique and control, satisfactory acidophilus milk can be produced, and, in their book, Rettger and Cheplin give a full account of its preparation and properties. Briefly the process consists in sterilizing milk, usually skimmed; allowing it to cool to body temperature; inoculating with recent, pure milk culture of B. acidophilus; and incubating at slightly above body temperature for eighteen to twenty-four hours, by which time sufficient coagulation and acidity will have resulted; the product is then cooled to arrest further growth and churned to mix it uniformly.

But this is not so easy as it reads; for the organism, B. acidophilus, is neither indigenous to milk nor so easy acclimated to it as is B. bulgaricus, although it can be cultured in whole milk, skim milk or whey. Again, the uncertain bacterial composition of milk interposes a considerable obstacle to the making and marketing of a strictly pure "acidophilus milk" to be shipped, stored and sold with a feeling of certainty as to its proper composition and palatability. The difficulty arises from the inherent nature of milk as an incubating medium from the instant it is taken from the cow; what it wil.

be changed to within a few hours depends upon the temperatures to which it is subjected.

To the lay mind and palate, a product may be entirely acceptable as "acidophilus milk," while the bacteriologist will be concerned with the bacterial changes which may have taken place in the milk before it was sterilized for use as culture medium in the making of the product. These changes account for much of the variation in the consistency, color, odor, taste and acidity, all elements of palatability, of different lots of acidophilus milk; and knowing the possible kinds and extent of these conditions, the bacteriologist understands the opportunity for even a highly palatable product to be impure or other than a reasonably pure acidophilus milk.

And since no feature of the palatability nor of the acidity, which is a by-product in the growth of Bacillus acidophilus, accounts for the beneficent effects of the organism, unless an "acidophilus milk" is actually, that is, bacteriologically, pure it is just a "buttermilk."

There is, however, well-intentioned effort on the part of "acidophilus milk" producers to make and keep their products outside of the class of commercial "buttermilk" which as now marketed contains in the best grades the lactic acid bacillus and bulgarian bacillus with the products of their growth in pasteurized, not sterilized, skimmed milk to which some cream is later added.

Because of the uncertain composition of bacillus acidophilus milks, whey cultures of the pure organism are still extensively used and will likely continue to be depended upon as a liquid preparation of the organism; while the compressed tablet or other solid forms will be used especially where convenience in carrying is a consideration.

These difficulties in the way to producing a satisfactory "acidophilus milk" on a commercial scale has led to expenditure of thought and effort on other means of marketing the organism, for during the past five years the practical value of bacillus acidophilus therapy has been repeatedly asserted by those who have studied it clinically, and there has been shown to be a well-defined use for this organism in form suitable for easy administration.

The latest development in these preparations is decidedly unique in that it adapts a feature of laboratory technique into a convenient, attractive and effective product.

The procedure of "plating" this organism in petri dishes containing a film of whey agar jelly has been commonly used as a means of isolation to get pure cultures both for identification and for inoculation purposes. Furthermore, during the last few years, agar itself has evoked much favorable comment because of its intestine-dilating and lubricating effects, so helpful in relief of constipation, a condition which so generally occurs with the numerous ills for treatment of which B. acidophilus has been employed. Realizing the significance of these several facts, the laboratory technician reflected along these lines: "Why not offer an agar block impregnated with B. acidophilus?" He added: "It would have none of the inconveniences of the whey culture and none of the uncertainties of milk cultures. It would have the convenience of the tablet and all of the advantages of both agar and B. acidophilus. And it can be made especially attractive by giving it a chocolate coating."

The idea was submitted to many doctors; they were struck with the ingenuity of this new form and its many advantages over past forms.

For production of these Bacillus Acidophilus Chocolate Blocks, the organism is grown in a special, artificially digested whey culture, with strict maintenance of its purity; large crops of the organism are harvested; incorporated with agar jelly, the mass shaped into blocks about three-quarters of an inch long by five-eighths of an inch wide by one-half inch thick; and these at once covered with chocolate coating to make a confection as is customarily done in production of "chocolates" from nuts, fruits, pastes, etc.; all of this process necessarily being carried out with every precaution to exclude contamination.

The adoption of a strain of B. acidophilus which has been acclimated to milk and in it developed to a high potency and viability is used, because such development is regarded by some observers as necessary to insure effective implantation.

The chocolate coated or finished pieces may be wrapped in foil to give them an impervious protective coat. But thus wrapped or unwrapped they have all of the attractiveness of the popular chocolate confection of high grade.

The blocks are chewed and swallowed like other chocolates, and since the chocolate coating is only covering and flavor, it may be

broken off by any who object to chocolate and the agar jelly eaten without it.

A block of the size mentioned is made to contain and therefore represent and equal the viable or potent organisms present in a pint of acidophilus milk. This chocolate block form has been used in a variety of affections ascribed to intestinal flora of undesirable type, with all of the encouragement that has been had from other preparations of the organism. There are no contraindications because of functional or organic derangements.

While dosage is a matter that must be left for the patient to work out under the supervision of the physician, the average rate of administration is one chocolate coated culture, or acidophilus block, two or three times a day, at or between meals, with or without a glass of milk or water as preferred. The physician will also advise on any special diet to be observed; although a large measure of the hope that has come with use of bacillus acidophilus therapy is the evidence that in most cases no special diet need be followed.

The immediately striking advantages of these chocolate blocks are the authenticity, purity and viability of strain, the high count per block, the mentioned effects of the agar, the tempting appearance, the pleasing palatability, the convenience of the package and of the individual block dose and the easiness of administration.

Many who do not care for milk and less for "sour milk" will eat these chocolates. Furthermore, such form of the organism permits avoidance of milk cultures by those who are disposed to gain weight through taking milk.

Thus it is seen that bacillus acidophilus therapy has gradually evolved with the usual accompaniment of a variety of preparations for its practice; and, starting with the assumption that the benefit was to be had from "sour milk," the study that has developed the understanding of the subject has both bacteriologically and clinically demonstrated beyond doubt that it is neither the milk nor the acidity that explains the beneficent effects of this organism. The immediate reason for its effect is yet to be learned.

All bacillus acidophilus products should be stored at moderately cool temperatures.

THE AMERICAN PHARMACEUTICAL ASSOCIATION, THE GREATER OPPORTUNITIES OF PHARMACY, AND THE AMERICAN PHARMACY HEADQUARTERS.*

I am deeply appreciative of the high honor conferred by the invitation to attend this meeting. I am always glad to visit in the Old Dominion, the birthland, homeland, or graveland of so many of our illustrious citizens—Washington, Henry, Jefferson, Madison, Marshall, Monroe, Tyler, Mason, Clay, Lee, Austin, Houston and among the greatest of these, Thomas Woodrow Wilson, and many, many others who should be mentioned and who have been part of Virginia's glorious history, having laid the foundations here and elsewhere that made possible the splendid records of the present and assure the bright promises of the future.

Governor Charles T. O. Ferrell, in 1897, in his welcome to the National Wholesale Druggists' Association, named so many in the list of Virginia's presidents, vice-presidents, secretaries of various departments—of state, of war, interior, navy—and other officials, that it would be idle for any other state, even Texas, to compete for rank. President Tyler's son, the Hon. Lyon G. Tyler, then president of William and Mary College, at the 1901 meeting of the N. W. D. A. proved very conclusively that Virginia should be the name of these United States; and Governor Swanson, at a more recent convention, welcomed all of the membership as Virginians, because if you come from Maryland and North Carolina, these states were once part of Virginia under charter received from the English king; if from the great Northwest, Virginia gave to the nation the great Northwest territory—Illinois and Ohio once being part of Virginia; as citizens of Louisiana, Missouri, Nebraska, they reside in a section purchased by a Virginian, Thomas Jefferson; Oregon, Montana and Washington were discovered by two pioneers from Virginia, Lewis and Clark; and now comes my surrender—for a Virginian president, President Tyler, conducted the Mexican War, and two great Virginian generals, Scott and Taylor, won the victories that extended the country to the Pacific Ocean. I gladly admit that it was during President Tyler's term that the Lone Star of Texas was added to those of Old Glory, and

*Parts of an address by E. G. Eberle before Virginia Pharmaceutical Association, June 24, 1925.

among the heroes of the Alamo and San Jacinto were many sons of Virginia—among the greatest of these, General Sam Houston, who came from within a hundred miles of this meeting place. The great Stephen F. Austin, for whom the capital of Texas is named, was born at Austinville in this state. Many a Texas youth has come to Virginia schools and later added to the greatness of his state, and a son of Staunton, in my opinion, was one of our greatest Presidents.

One of the Calendars of State Papers of 1610, in the Public Record Office in London, England, contains instructions relative to things that may be imported from Virginia. The late Daniel Hanbury, an honorary member of the American Pharmaceutical Association, one of the editors of *Pharmacographia,* presented a paper on this subject, and thinking it might interest you, I had it typed and have added a brief comment.

The Westover Manuscripts, and particularly notes contributing thereto, contain a great deal of information relative to medicinal plants of Virginia and North Carolina. Colonel William Byrd was an observing man, a lawyer by profession, and whatever was of value to his country and his people had an interest for him. Not so long ago the *Virginia Pharmacist* contained an historical note or two dealing with this period of Virginia-Carolina history. All of this shows that long ago Virginia contributed to the materia medica of this country.

The Virginia Pharmaceutical Association.

It is neither opportune nor possible to speak of the many who have impressed American and Virginia pharmacy, nor would those who are still with us desire that—you know them well and appreciate them accordingly.

It is the history of organizations that a few must shape affairs so that the constituency may "carry on" and promote the general interests—the support of the membership to that end is a powerful help and often a comfort in discouragement.

The Virginia Pharmaceutical Association was organized January 4, 1882, and the first annual meeting was held May 16th of the same year. I have no desire to make comparisons or render appraisement, but deserving of niches in the halls of pharmaceutical accomplishment in its several divisions you have men like the late T. A. Miller, who contributed to the regulation of pharmacy and

the education of pharmacists in this state; T. Roberts Baker, of Richmond, who was your first president, and also an early vice-president of the American Pharmaceutical Association; Dr. Richard H. Stabler, of Alexandria, was president of the American Pharmaceutical Association, 1870-1871. All of them were retail pharmacists; one of them in the wholesale business; two of them taught in schools of pharmacy. All dared to do as they saw the right, they sought to bring others to their way of thinking and join with them in bringing about a better understanding by the people of the mission of pharmacy. Thirty-odd years ago T. Roberts Baker read a paper before this association on "The Relation Existing Between Pharmacists and the Community" in which he directed attention to the important services performed for the community by pharmacists.

Joint Professional Responsibilities.

Any one of the divisions of my address would supply a subject for extended comment, but as you are familiar with the various phases of pharmaceutical advance, you will read between the lines and draw conclusions which will, I am certain, not differ greatly from those I would have presented if time permitted. For many years I have used a text frequently which implies that citizens are entitled to a safeguard of their health as much as of their property, and in this connection, chemistry, medicine, dentistry and pharmacy have joint responsibilities—co-operative work is incumbent upon the votaries. The public has a right to expect and investigate the co-operation of industries and professions, and to determine whether they are giving it the best service and protection possible. There is a widening field of medical science in which these will find much to do. It is very necessary that pharmacists not only carry the message of pharmacists to the people but that they exemplify it in their activities and interest in pharmacy. Let druggists handle what they will, conduct the business according to system and efficiency, but our work, our service, rests on pharmacy and not on the many divisions that are attached, no matter how important and essential they are for the successful conduct of pharmacy. Understand me, please, I am *not* underestimating the value of the business side of the drug store; I am agreed that at present, and for many years, maybe always, side lines will be necessary, for the public is better protected by the successful merchant who is a pharmacist than one who ekes out an

existence only. That I want to make clear. I have in mind a drug store where every effort seems to be directed to the merchandise selling end; however, few prescription departments are better equipped than the one in this store. But pharmacy is one thing and merchandising is another, and the public can and will understand the higher possibilities of pharmacy if support is given by the people, and they will give it. Your legislators have come to the proper recognition, and this is so because they have been shown. In some states the message is still not clear to the legislators—perhaps the pharmacists of such states are at fault.

The time has arrived when there is real co-operation of the professions and the industries—the development of insulin manufacture is a most important step in that direction. Those who question such co-operation should have seen the interest about the display at the American Medical Association meeting in Atlantic City a few weeks ago, and also the interest exhibited at the U. S. P. display. All of this means values beyond calculation for the public. The Medical Center movement is another advance in which pharmacy must take its proper place.

The Science of Pharmacy.

Carlyle said, "The degree of vision that dwells in a man is a correct measure of the man." Arthur Little, at the Franklin Institute Centenary, said that the practical man, busily engaged in repeating the errors of his forefathers, has little time and less consideration for the detracting theories and disconcerting facts of the man of science. Herein is really a reason why pharmacy does not gain the publicity to which it is entitled; everyone admits pharmacy has a part, and even a large part, but pharmacy should have specific mention, the same as medicine, chemistry, etc. Science has enabled man effectively to combat disease and has added years to the average life and made it better worth the living, and pharmacy has contributed largely thereto.

The medical sciences may be grouped, that is, science as it applies to medicine in general wherein scientists in related and unrelated divisions have a part, and it is up to pharmacists in a more specific way to claim a rightful share and recognition in their contributions to science, so that pharmacy may be accorded its place in the group. The complexity of pharmacy, touching the precincts of

other workers, is largely responsible for dimming its own lustre and adding glory to other departments of science, the work of which is less complex. The answer is, of course, more research and that the reports thereof be credited to pharmacists and the pharmaceutical laboratories. As a matter of fact much of the research work—on more effective and safer remedials, the development of these agencies to make them more efficient and safer—originates and is perfected in pharmaceutical laboratories, and the fundamentals are taught to and implanted in the students of colleges of pharmacy. There is no desire to take away earned prestige from others, nor to make far-fetched claims for pharmacy, but it is a fact that what really is pharmacy or accomplished by the work of pharmacists is sometimes, if not frequently, credited otherwise.

In pharmaceutical research and by the work of pharmaceutical laboratories it is sought to make practical application for better medical and surgical treatment—prevention, alleviation and cure of diseases and greater and safer success in surgery. In the pharmaceutical industries and the drug business—through gained experience—more economical and improved methods are applied, and employment is given to help which procures a livelihood for those so engaged, while pharmacy's share in the development of business and commerce is augmented, and the wealth and health of civilization benefit largely.

Activities of the American Pharmaceutical Association.

The foundation of a worth-while government does not change very much. The governing principles are applicable even during what we recognize as decided changes, periods of growth and development, and the same applies to associations. It is really striking to find that the reasons for the formation of the American Pharmaceutical Association are not so different from the purposes which activate our thoughts and work at present, and it is worthy of remark that the reorganization plan recently made effective and in process of conformation is, in principle, not very different from that of 1852; it is readily discernible, as with all or nearly all other developments, that we are indebted to those who passed from the scene of action for suggested ideas, motives and desires—that we are working on borrowed capital, and it is the duty of the present generation to make the best possible use of it for pharmacy, and in

service, and leave to posterity an evidence of our faith in pharmacy.

A number of years ago, Dr. James H. Beal, in commenting on the history of the American Pharmaceutical Association, said in substance, that there is not a single field of pharmaceutical activity into which this organization, representative of American pharmacy, has not entered and done valuable work; scarcely a problem, ethical or practical, to which it has not given serious attention; hardly a matter of general interest to our profession to which it has not made contributions of value; and there is not a single individual connected with legitimate pharmacy in any of its branches who is not debtor to it for substantial benefits received.

It would be trespassing on your time to dwell long on the history of the founding of the American Pharmaceutical Association and, aside from a few brief remarks, I will leave a reading of it to you in the Golden Jubilee address of Dr. Frederick Hoffmann.

Conditions in the American drug market in the earlier years of the United States prompted the organization of the American Pharmaceutical Association. Representatives of colleges of pharmacy planned the organization as a delegate body, and it was not until after considerable debate that individuals were admitted to membership. The delegates from other organizations were always in evidence, and being in fact a national association, whatever concerned pharmacy and pharmacists throughout the country was a subject of importance for the delegates of the American Pharmaceutical Association, and, in order that all matters of general importance would come to its attention and be properly considered, the organization of state associations was encouraged. If you will look through the early list of organizers and officers of these bodies, you will find the names of American Pharmaceutical Association members, and that is the deep concern of the parent body today—to have good working state associations so they may unite with the House of Delegates in shaping the interests of pharmacy; and so that no division of the drug industry may be overlooked, delegate representation is invited from all of them.

The spirit which prompted this move (it was not new—it began with the founding of the Association) seemed so disinterested to some that it could not at first be fully understood, and it is not now, but year by year the power will be appreciated, and with due thought-

fulness, for as in a business the directors seek to build successfully, so here it can be most assuredly assumed that the members of the House of Delegates will act for the best interests of pharmacy, which represents their interests. Realizing the complexity of the drug business, its various interests, the necessity of having a national organization wherein delegates meet on an equal footing—whether representatives of the retailer or wholesaler, dealer or manufacturer, teacher or board of pharmacy member, proprietor or clerk, student of laboratorian, or any other individual or group attached to pharmacy in any way—will readily be admitted by all who have studied the essentials of organization.

Problems of 1852 and 1925.

It is striking, as has been said, that the questions of importance seventy and more years ago are topics of today, somewhat different perhaps, but along the same lines. Professor Edward Parrish did not consider it beneath him to discuss such questions as "Pharmacy as a Business." This article is published in the Proceedings of 1856, and is well worth reading. He begins this paper with these words:

"Much is said and written about the *science and the art* of Pharmacy, but in the present essay I propose to treat it as a *business*, and to hint at some causes tending to its depreciation, and some of the means within our reach by which to increase its importance and respectability in a pecuniary point of view."

He points out that the small capital and limited scientific education required make ours a very easy business for persons of limited means to enter; hence, its gains are greatly divided.

He speaks of the number of drug stores, which was a most interesting subject of a paper by Professor Wortley F. Rudd at the last meeting of the American Pharmaceutical Association. Professor Tarrish said that "In Philadelphia (in 1856), which would fittingly support one hundred pharmacists, five times that number may be counted."

He also discusses price maintenance, and concludes by saying: "If we would see our profession rising in social standing and influence, we must cease to compete in prices, join in holding up the standard of remuneration to a just and reasonable point, and by a liberal and fraternal policy toward each other, and a dignified bearing

toward the public, show that our profession merits a higher consideration than pertains to the mere trader, and that the pharmacist deserves to be remunerated for his knowledge and skill as well as for the wares he offers for sale."

You will note that Professor Parrish brings quite a number of points into his disquisition which are subjects of importance today. He tells us what a profession is; he supports price maintenance; he brings in an essential of association policy, namely, fraternal regard and belief in one another, and the fact that a druggist is more than a merchant.

Poison laws, local and state pharmacy laws, were given consideration during the first decade of the Association; the Pure Food and Drug Law was under way, U. S. P. revision was aided, the National Formulary had its inception, the Syllabus had a good start, and the Recipe Book was in the minds of some of the members.

After all there is little new—we are deeply indebted to our antecedents, contemporaries and posterity. What were the objects of our forefathers in pharmacy?

1. To improve and regulate the drug market by preventing the importation of inferior, adulterated or deteriorated drugs and by detecting and exposing home adulterations.

2. To encourage such proper relations among druggists, pharmacists, physicians and the people at large, as may promote the public welfare, and tend to mutual strength and advantage.

3. To improve the science and art of pharmacy by diffusing scientific knowledge among apothecaries and druggists, fostering pharmaceutical literature, developing talent, stimulating discovery and invention, and encouraging home production and manufacturing in the several departments of the drug business.

4. To regulate the system of apprenticeship and employment, so as to prevent, as far as practicable, the evils flowing from deficient training in the responsible duties of preparing, dispensing and selling medicines.

5. To suppress empiricism, and to restrict the dispensing and sale of medicines to regularly educated druggists and apothecaries.

6. To uphold standards of authority in the education, theory and practice of pharmacy.

7. To create and maintain a standard of professional honesty equal to the amount of our professional knowledge with a view to the highest good and greatest protection to the public.

Co-operation and Present-Day Association Opportunities.

What the Association has done has been summarized by quite a number, and in considerable detail; its undertakings and what it is proposed to do have been reviewed by many who have pledged their faith thereto, and many more belong to that majority who can always be relied upon to do their part, and judging from past and present history, and those with whom it has been my fortune to come in contact from the Old Dominion, they will fully measure up to the height of their opportunities.

I have endeavored to point to the onward trend of pharmacy. The American Pharmaceutical Association will not, can not, neglect its duties to the branches comprising pharmacy in general and widest significance—it will not, because it has always measured up to its responsibilities; there has never been a desire to monopolize the field of drug organization, but there has been held out the hand of helpfulness wherever and whenever pharmacy might be served; it can not, because there is no other national organization that is so comprehensive in its aims and purposes—giving all for all, it should have the staunch co-ordinated support for pharmacy in general, of all drug trade organizations, state and national; serving all, pharmacy will make progress and all the allied bodies will benefit.

Progress of the Medical Sciences.

Co-operation is the keynote of the progress of the divisions of medicine; it is the message which has been repeated frequently in the *Journal's* pages; it has not always met with response, but the signs are becoming brighter. The activities of pharmacy have, at times in the past, been hesitatingly accepted quite frequently not at full worth, not always admitting their importance; with a question if, after all, the paramount object of these industries was not gain, and the service rendered merely incidental. All of this is changing, and our valuation of the mission of pharmacy—evidenced by our strong support, our aim to be of greater service through the headquarters wherein will be established laboratories, a library and museum, all absolutely essential for this progress—is strengthening not only our belief in pharmacy, but that of allied workers and of the public; and pharmacy, after all, is the basic purpose of the drug business.

If it was necessary for this audience, at this point I would ex-

plain the advantages of Association endeavor over that of the individual, but as I am approaching the time limits for this presentation I will quote instead from the remarks of one who speaks with authority for medicine, but without going into the scientific therapy which he discussed in connection with pharmaceutic research at that time, namely, Editor Dr. Morris Fishbein, of the *Journal of the American Medical Association*. My purpose is only to use the words of another in connection with a message I have frequently repeated in our *Journal*.

Dr. Fishbein said, "Today the trend of opinion is turning against therapeutic nihilism; there is a call for the return to that older type of physician in family practice whose primary function was the alleviation of pain and the healing of illness. And this newer trend is the result not only of a changing philosophy as to the functions of the physician but equally of that very scientific study which, for a few decades, caused some to doubt the virtue of their remedies."

Again, after pointing out some of the defects to be corrected in large manufacture—for the address was delivered before the American Drug Manufacturers' Association—he said, "The commercial chemist and pharmacist is merely the scientist of the university transported to a new environment and compelled to give thought to practical considerations that do not, perhaps, disturb him when within the cold walls of some sanctum of learning. But it is unreasonable to believe that an honest man must be dishonest in any circumstances. After all, honesty is a state of mind, not the particular property of any chosen group. It is a pessimistic man indeed who believes that outside the walls of universities there exist no scientists who are not corruptible. The debt of the public to the investigators of commerce is no slight one."

He stated that behind the physician stand those charged with the preparation of the remedies he is to use, and between him and them those who would help him in the hour of need to select wisely. "It has been our hope," he said, "that this intermediate group, represented by the scientific pharmacologists, the teachers of therapeutics, the bacteriologists, the medical writers and journalists, the Council on Pharmacy and Chemistry, might work more closely with those who prepare our remedies, so that the physician might feel safe in every instance in trusting the preparations and the statements made about the preparations of at least a considerable number of manufacturers. With such co-operation we may approach nearer and

nearer to that time when the rebuke of Paracelsus to the faint-hearted physician may be warranted in fullest measure." This translated, reads: "Never must the physician say, the disease is incurable. By that admission he denies God, our Creator; he doubts Nature with her profuseness of hidden powers and mysteries."

Pharmacy's Responsibilities.

The following quotations are from an article on "Co-operation Among Scientific Men," by Walter P. Taylor, of the United States Department of Agriculture, in a recent issue of *The Scientific Monthly:* "One essential to effective co-operation among scientific men is the definite abandonment of ultra-individualism, and its replacement by group loyalty, sympathy and mutual helpfulness."

I trust these quotations have helped to make the purpose of my own statements understood, namely, that pharmacy is moving forward, and its progress has been influential in advancing the opportunities of other scientists in the treatment of the sick and prevention of disease. We may apply what Dr. Taylor said: "It is perfectly certain that in addition to our very proper present-day ideals of whole-hearted devotion to our specialties we must assume a new ideal of professional and community co-operation." And that is expressed, not only by the establishment of the medical centers, the better hospital facilities, better pharmacy, but decidedly by the promotion of the American Pharmacy Headquarters Building.

Professor J. G. Beard, in speaking of the responsibility of pharmacy, said, "The drug business in the abstract, as distinguished from the individual enterprise, must have a basic purpose, which is to provide for certain material needs of humanity. The immediate end may be profit to the individual engaged in serving the public, but whenever retail pharmacy ceases to perform the basic function of business, then it is no longer entitled to exist.

"A livelihood and, where practicable, a competency; is due very man, but the drug business owes no person a living merely because he elects to engage in it. On the contrary a druggist, like all other members of society, enjoys an individual and a corporate protection and an equality of opportunity which cause him to owe civilization a debt which can be discharged only by increasing the wealth or promoting the health of the world or by putting into life more than he takes out—by producing more than he consumes."

Duties of State Associations to the Parent Organization.

Most worthy promotions of American pharmacy, since the organization of the American Pharmaceutical Association, had their inception within this organization. The History of American Pharmacy, now being written, will evidence that, and pharmacists in other countries add their testimony. No other organization is in position to work with all other organizations as the American Pharmaceutical Association; its bounds are those of legitimate drug business and pharmacy, and touch the domains of other organizations that have some activities in common—a most important consideration. But there is still one more point worthy of emphasis, and that Dr. Hoffmann discovered and embodied in his address in 1902, when he said:

"A closer inquiry will bear out the fact that the original projectors of most of these organizations (state) were active members of the American Pharmaceutical Association. . . . It was almost throughout the initiative action and prompt influence of local pharmacists who were enthusiastic members of the national association, and inspired by public and professional interest, that most actively prompted the organization of pharmaceutical state associations.

"These associations owe their origin as also the impetus and guidance towards their successful career largely to the influence and initiative example of the national association. They, therefore, should consider it a privilege and duty to stand in loyal allegiance to the time-honored parent Association and to work harmoniously with it in every common cause for the common good."

The answer as to what will be the further aims of the American Pharmaceutical Association is—to serve all those whose interests are centered in it for the common good of pharmacy, the drug business in general, and the benefit of public health and weal. This is your opportunity and mine.

The American Pharmacy Headquarters an Associated Endeavor.

Quoting Professor Kelly, the Headquarters Campaign has been a success; it is only a question as to how great a success you wish it to be; few, if any, are not convinced that the building is a necessity; the undertaking is national, even international, in its scope and influence; it has attracted public attention, and more than any other prior undertaking, because of the publicity which has given the public an appreciation of the mission of pharmacy and of its part in safeguarding public health.

The headquarters building fund is truly representative of all pharmaceutical interests, for all have contributed, and all have part in the administration of it through the House of Delegates. Through this body the combined influence and power of pharmacy for the good of pharmacy and humanity will be exerted by the operations of the headquarters. The benefits to be derived differ largely according to the viewpoint of the individual—many realize the importance and value of the museum, library and laboratories. "Others," as Dr. Dunning has said, "understand better the value of a great Publicity Bureau of a national character which will disseminate knowledge to the druggists throughout the country and will develop propaganda for the public of an educational character and will result in a better understanding of the great service which is offered and given by the corner drug store to its patrons. Also, the druggist generally can well understand and appreciate the importance of adopting educational measures and other influences which will tend to modify and improve many of the laws and regulations which are imposed upon the practice of their profession, through lack of understanding by those responsible for these laws and regulations, or, possibly, for less justifiable reasons. They also realize that many of these insidious laws and regulations may be eliminated or prevented from becoming laws, when it is proven to those responsible for them that they are unjust and ill-advised."

A fully-equipped laboratory has been donated which will serve the revisers of the Pharmacopœia, National Formulary, Recipe Book, and researchers, in many ways, and to such an extent that an effort to outline the possibilities, even briefly, would extend this address beyond reasonable limits.

The library will serve all divisions of pharmacy, and will become a most important auxiliary for the educational objects, and an efficient factor for the advancement of pharmaceutical training.

Dr. F. B. Kilmer has spoken of the museum in a concise way, as follows: "The Museum will not simply be a collection of curious specimens of the art, but rather an exposition of what pharmacy has done, and what it can do—an adjunct of living, moving pharmacy; a demonstration of operative, theoretical and practical pharmacy, as well as of educational pharmacy, manufacturing and industrial pharmacy. An exposition to which the world of pharmacy—manufacturer, wholesaler and retailer—can make pilgrimages; a place where

pharmacy as it was, as it is, and as it will be, is unrolled before the onlooker."

We admit that much work has been done, but much more is possible through associated effort—the cement of professional and business structure. Every business and profession is rewarded according to the ultimate value of its service, provided the community is made aware, by publicity, of that value. The headquarters building will be publicity for pharmacy of a high order, because it expresses faith in the mission of pharmacy; it will be the out-post of pharmacy and afford the means for combating destructive tendencies, conserving and preventing duplication of effort, and make possible a co-ordinating force and clearing house for industrial, business and professional problems; it will mean a new note of pharmaceutical progress, because behind all of this stands the co-ordinated association of the drug business and of pharmacy. It will give us morale, greater confidence, and strengthen our faith in pharmacy. Sometimes, I am afraid, other activities seem greater to us than ours, because we have been on our knees. Let us stand up.

All of the foregoing undertakings will be strengthened by several actions of the Board of Trustees of the United States Pharmacopœia, recently announced:

The Board of Trustees in co-operation with the American Pharmaceutical Association is arranging to publish an Abstract of Comments on the Pharmacopœia. This is very desirable because the United States Government has discontinued the publication of this series of books.

The Joseph P. Remington Memorial, which has been under consideration by the Board of Trustees since the death of Professor Remington, is now assuming definite form. A fund will be set apart so that the interest on the same can be used for research work on subjects of Pharmacopœial interest and value. The American Pharmaceutical Association will be the trustee of the fund and the Chairman of the Committee on Revision of the U. S. P. will be chairman of a standing committee to be named by the Board of Trustees for the purpose of determining the subjects of research work and to recommend to the trustees the persons granted awards from the Remington Memorial Fund.

May I ask those who have not contributed to the headquarters to do so, and those who have given to induce others to give? I like

the enthusiasm of the little boy who was selling soap in a recent drive to raise money for Radcliffe College. A lady whom he addressed asked the lad why he was selling soap; he promptly replied, "To raise three million dollars for Radcliffe." "Three million dollars," the lady said, "and are you going to raise it all yourself?" "No, ma'am," said Johnny, "there's another little boy helping me."

Let us help the cause of pharmacy according to our ability and make the headquarters an early and a worth-while accomplishment. Thank you!

MEDICAL AND PHARMACEUTICAL NOTES

THE COMMONWEALTH STUDY OF PHARMACY. BULLETIN NO. 7. —This is the seventh of a series of monthly statements issued by the staff conducting this study.

Since the study as now being conducted revolves largely around the filling of prescriptions it may be interesting to know what is being done on the subject of compounding.

There is a general feeling that prescription-filling today consists very largely of a simple process of transferring from one container to another and that the ingredients of such prescriptions are largely proprietaries. If this were true, the pharmacist would need to know more about proprietaries, and the necessary knowledge of compounding problems would be reduced. Among other studies relating to compounding were the following:

1. At the outset in order to determine whether the study should be confined to official ingredients in prescriptions we studied 1000 prescriptions, selecting at random 100 Rx from ten states. Following are the results:

(a) 51.9 per cent. contained only official ingredients.
(b) 29.0 per cent. contained both official and non-official.
(c) 19.1 per cent. contained only non-official.

2. For the same reason as above stated a second study of 1000 Rx was made showing the following results:

(a) total number of ingredients—2680;

(b) of these 81.4 per cent. were official; 18.6 per cent. non-official.

Note: Non-official—anything not U. S. P. or N. F., including proprietaries.

3. The ingredients of 17,577 prescriptions were tabulated as the study progressed and the results while varying slightly from the study of only 1000 prescriptions made earlier are even more striking. Of the 40,454 items in these 17,577 prescriptions:

77.8 per cent. were U. S. P.
5.4 per cent. were N. F.
6.8 per cent. were non-official but not proprietaries.
10.0 per cent. were proprietaries.

4. When the tabulation of types of ingredients in the 17,577 prescriptions had been completed it was noted that a number of classes of galenicals, such as emulsions, suppositories, ointments, etc., appeared very seldom. The component parts of these classes appeared but were tabulated separately. It therefore became necessary to make another study of the prescriptions to determine just how many times the pharmacist actually was called upon to compound galenicals as mentioned above. A study was made of 10,000 prescriptions taken from the 17,577 previously studied with the following results:

Of the 6384 liquid prescriptions, 20.6 per cent. required only the filling of one bottle from another; 79.4 per cent. were mixtures that called for some skill.

Of the 1170 capsules (all kinds), 3.8 per cent. were proprietaries and would be bought while 92.6 per cent. should have been filled by the pharmacist.

Of the 881 powders, 4.2 per cent. were proprietaries while 95.8 should have been prepared by the pharmacist.

Of the 679 ointments 14 per cent. were proprietaries and 86 per cent. should have been made by the pharmacist.

*Of the 481 tablets all would be purchased. The same was true of the 149 tablets triturates.

*Of the 144 pills 54.8 per cent. would be purchased, and 45.2 per cent. should be made by the pharmacist.

*Of the 76 suppositories 31 per cent. would be purchased and 69 per cent. could be made by the pharmacist.

There were 22 prescriptions for Konseals, 4 for Cataplasma and 1 for a tube of tooth paste, all of which the pharmacist would make. There were 5 prescriptions for troches and 2 for ampoules which would be purchased.

From the above it is apparent that compounding is not a lost art. The filling of prescriptions is not, as many now believe, largely a matter of transferring a proprietary or secret formula preparation from one container to another.

The information and skill necessary to do the compounding involved in these prescriptions is being worked out by Prof. Louis Saalbach, of the Pittsburgh College of Pharmacy, and will appear in the final report.

MEDICOLEGAL.—Indictment for "Prescribing Medicine"—Sale of "Patent Medicines" for Certain Diseases. [Harper v. State (Ala.), 102 So. R. 55.]—The Court of Appeals of Alabama, in reversing a judgment of conviction of defendant Harper, says that the indictment charged that he did treat, or offer to treat, diseases of human beings in this state by prescribing medicine, the kind and description of which was to the grand jury unknown, without having first obtained a certificate of qualification from the state board of medical examiners. The indictment was not in the form prescribed by the Code, Section 7161, No. 84. But it did substantially follow the statute prescribing the offense sought to be charged. It employed the language of the statute so far as such language was necessary. The statute provides that the offense shall consist of treating or offering to treat diseases of human beings in this state "by any system of treatment whatsoever." The indictment charged that the defendant treated or offered to treat diseases of human beings in this state "by prescribing medicine." Prescribing medicine is a system of treatment and comes within the inhibition of the statute. The indictment specified the means of treatment alleged to have been employed by the defendant in treating or offering to treat diseases of human beings. It is not a valid objection to the sufficiency of an indictment that it describes the of-

*With the proper facilities part of those marked with a (*) might have been made.

fense alleged to have been committed with a greater degree of particularity than the statute creating the offense. The indictment was sufficient, and the demurrer thereto was properly overruled.

The defendant was a licensed vendor of "patent medicines." Certain persons who testified as witnesses for the state went to him and told him that they suffered from certain diseases of the body, and he sold them of his wares certain "patent medicines," on which there were labels recommending such medicines for the ailment indicated and designating the dose to be taken. The defendant did not hold himself out as a physician, made no charge for services as such, and received no compensation other than such profit as he derived from the sale of the "patent medicines." It was also in evidence that in selling the medicine the defendant recommended it as being a remedy for the diseases specified. In the opinion of this court, this did not constitute a violation of the statute. The rulings of the trial court were not in accord with this view, and for this error the judgment is reversed, and the cause remanded. (A rehearing denied.)

In a dissenting opinion, Justice Foster says that to prescribe does not necessarily imply a written prescription. It may be an oral one. What is necessary is for the party prescribing to indicate or recommend the medicine to be used. When he places himself in the position of a medical adviser, when he designates, indicates or names the medicine to be used or administered for a certain disease, he is prescribing such medicine for that disease. In medicine, to "prescribe" remedies is to "write or give medical directions; to indicate remedies." It is not necessary that such prescription be written. It may be given or indicated verbally. The defendant did not merely sell the medicine asked for. He indicated to the patient the appropriate medicine for his particular disease. The conclusion is inescapable that he "prescribed" the medicine.

Would the fact that the medicine prescribed was "patent medicine" and the defendant was licensed to sell "patent medicine" absolve him from criminal responsibility? Justice Foster says he thinks not. The defendant's license was to sell the medicine—nothing more. His license to sell such medicine did not authorize him to prescribe the same. If such were the law, it would mean that one obtaining a license to sell "patent medicine" might equip himself with a "cure for every ill," assert his competence to cure diseases of all kinds, pose

as one trained in the art of healing, and after conferring with the patient and ascertaining his disease, determine the proper remedy for such affliction, select the medicine decided on, advise its administration to the diseased person, and thereby evade a law directed primarily for the purpose of preventing quacks from imposing on the public by masquerading as men trained and learned in medical science. The license to sell "patent medicines" does not protect the vendor thereof from criminal responsibility for prescribing such medicine as a remedy for a particular disease. It could not be said as a matter of law that the service which the defendant rendered in prescribing the medicine was a gratuity, for it could be inferred from the evidence that he received a valuable consideration and adequate compensation therefor in the sale of the medicine prescribed.—*Jour. Amer. Med. Assoc.*

Synthetic Methanol (Wood Alcohol) Poisonous.—Methanol, the synthetic alcohol which is now being made cheaply in Germany, is just as poisonous as the similar wood or methyl alcohol, despite claims that the foreign product, because of its high purity, is harmless. This statement is made by Dr. Reid Hunt, of the Harvard Medical School, in the July issue of *Industrial and Engineering Chemistry,* following a series of experiments.

"The results with the German (synthetic) methanol were the same as those obtained with pure methyl alcohol obtained from wood distillates," writes Dr. Hunt. "It can confidently be predicted that the use of the synthetic methanol as a beverage or as an adulterant will be followed by the same disastrous effects to life and vision as have characterized such uses of wood alcohol. Those who are circulating the report that the synthetic methanol is not poisonous are not only stating an untruth but are assuming a grave responsibility, for death or blindness will inevitably be the fate of a number of those who may be misled by such statements and attempt to use synthetic methanol as a beverage."

As a result of his experiments on animals, Dr. Hunt finds that small doses of either methanol or ordinary wood alcohol are not as poisonous as the same amount of ethyl, or grain, alcohol; but when the doses are repeated a few times at 24 hour intervals, the methanol has the most harmful effect. This is because the animal develops a tolerance to the ethyl alcohol. Methanol, however, works differently,

as it has a cumulative action, a number of small doses having the same effect as a similar amount given at once.

Man, however, is sensitive to both, and, according to Dr. Hunt, a small dose of methyl alcohol is more harmful than a similar dose of ethyl alcohol. "The more highly developed nervous system of man is more seriously affected by methyl alcohol than is that of the lower animals and permanent blindness has often been reported from single, sometimes small, doses of methyl alcohol, whereas such results are unknown in the case of ethyl alcohol."

A NEW ALKALOID IN ACONITE.—Mr. Goris has discovered a new alkaloid in a well-known plant—aconite, already known as containing an extremely poisonous alkaloid called aconitine. The new alkaloid isolated by Goris, and which he has called antherine, has the peculiar property of immunizing against the action of aconitine. In fact, if an animal were to be poisoned by aconitine, it is shown that even with large doses of antherine no improvement is effected but death results. If, on the other hand, antherine be injected into an animal and then it is subjected to the poison, aconitine, no poisoning results. This immunizing property of two compounds obtained from the same plant is all the more interesting because this kind of a property is met principally in the domain of serums and vaccines produced from animal organisms. Products which are in general indefinite, while in the present case, the alkaloids are definite compounds and crystallizable. This is the first time so far as we know, that such a fact has been observed.—*Jour. Ind. and Eng. Chem.*

ADVERSE REPORT ON ZINC STEARATE.—The Committee on Accidents of the American Medical Association, with the co-operation of the manufacturers, has submitted the following recommendations:

1. That *all* manufacturers of zinc stearate powders for infants be requested to use a self-closing container of a type which does not lend itself to manipulation by an infant; and to place a uniform caution label on the container.

2. That the use of zinc stearate as a dusting powder for infants be discouraged by the medical profession because of lack of therapeutic evidence of its value.

Ordinarily it would have been quite proper to have a pet legislator draft a bill authorizing this medicament or forbidding its manufacture. That brand of hysteria is happily losing its flavor and the American Medical Association takes the lead in a newer, more agreeable method of solving such problems. The reputable manufacturers are asked to co-operate in the investigation and this, their report, shows how well the plan operated:

"After the meeting with your committee, Friday, October 31, the group of manufacturers, packers and distributors of zinc stearate dusting powders went into conference and begs to submit the following as a result of that conference:

1. It was unanimously agreed to adopt a self-closing top.
2. We recognize that consideration should be given to the number, size and shape of openings in the container.
3. We agree that a precautionary statement on the label is desirable and, should you wish it, will submit the various precautionary statements for your approval.
4. It is our opinion that, with the adoption of 1, 2 and 3, no legislation covering this subject is at all necessary.

The group formulating the foregoing opinions was as follows: Dr. Burdick, representing the Abbott Laboratories; Dr. Searle, representing the American Pharmaceutical Manufacturers' Association; Thurston Merrill, representing William L. Merrill & Co.; Dr. Murray, representing Merck & Co.; Euclid Snow, representing the Mallinckrodt Chemical Company; H. H. Fisher, representing the American Druggist Syndicate; F. L. McCartney, representing the Norwich Pharmacal Company; H. Trawny, representing Lehn & Fink, and H. W. Rhodehamel, representing Eli Lilly & Co."

NEWS ITEMS AND PERSONAL NOTES

Professor Ivor Griffith is scheduled to succeed Professor Charles H. LaWall as Professor of Organic Chemistry in the Wagner Free Institute of Science for the session beginning September, 1925. Professor LaWall has handled this work for sixteen years, having succeeded Dr. Henry Leffmann at that time.

A very interesting and entertaining faculty meeting was held on Tuesday evening, May 26th, at the Franklin Inn Club, the junior

members of the faculty staging a number of sketches which were thoroughly enjoyed even though some of them were directed toward the embarrassment of the major faculty.

A rather interesting diversion was the presentation of an umbrella to Professor LaWall and one to Professor Cook, by the members of the faculty, in commemoration of the twenty-fifth year of their service on the faculty of the College. A like gift was bestowed upon Professor Foran, who terminates this year his connection with the college in order to take another position.

Professor Ralph R. Foran, Associate Professor in Analytical Chemistry and especially connected with the Bachelor of Science courses of the College, has resigned to take a responsible position on the chemical staff of the Powers-Weightman-Rosengarten Company at their central laboratory, Ninth and Parrish Streets, Philadelphia.

On Wednesday, May 27th, the college lost one of its most valuable Faculty members in the person of Professor Wallace S. Truesdell who had been Professor of Latin for nearly twenty years. Professor Truesdell was a man of high scholarly attainments, a graduate of Johns Hopkins University, who for many years had taught Latin in the Germantown Academy, a noted private school in Philadelphia, and he gave part time service to the College.

On Thursday evening, May 21st, the members of the Pharmaceutical Profession in Philadelphia listened with interest to an address by Sir William S. Glyn-Jones delivered to a representative group gathered in the College Auditorium. The address was preceded by a formal dinner at the Bellevue Stratford, where the members of the special committees appointed for the purpose and the officers of the various pharmaceutical organizations in Philadelphia acted as hosts. Sir William was accompanied by Lady Glyn-Jones and by Mr. and Mrs. J. A. Kenninghan of London.

On Friday, May 22d, Sir William had another conference relative to the discussion of educational problems with the members of the College staff and he visited typical pharmacies in Philadelphia.

He also met with the Executive Committee of the P. A. R. D. at the Headquarters Building of the latter organization.

The graduate, which is the Year Book of the College has been edited by J. B. Pilchard, of the senior Ph. G. class. It is an exceedingly attractive volume, and Mr. Pilchard is to be congratulated for the fine product he has turned out.

The broadcasting season has terminated and we expect to resume them in the fall at the time of the public lectures.

Co-operative plans have been made with the Y. M. C. A. to have the Popular Science Lectures given in one of the auditoriums of the Central Branch, at 1421 Arch Street. This will give a larger field from which to draw an audience and excellent opportunities for dissemination of the scientific information which is covered by these lectures which are becoming an institution in Philadelphia.

SAMUEL GERHARD, oldest living graduate of the Philadelphia College of Pharmacy at the time of his death, passed away at the Masonic Home, Philadelphia, on June 7, where he had resided for a year and a half. It is believed that his death was superinduced by the heat. He was ninety-two years of age. He was one of the best known residents of the Kensington section of Philadelphia, where he ran a drug store for sixty-seven years. He was always extremely proud of his "oldest graduate" record, and often spoke of the banner class of '54. He sold out his business in 1921, and made his home with sons previous to entering the Home. He was a member of the Masonic and Odd Fellows' orders, and was president emeritus of the Lutheran Church of the Atonement. He is survived by three sons, five grandchildren, and two great-grandchildren.

A NEW BRAND OF INSULIN.—The pancreas contains two kinds of tissue cells. The cells of one kind secrete the pancreatic juice, an external secretion which is conducted into the intestine through the pancreatic duct. The cells of the other kind are scattered in

groups throughout the gland. These are known as the "islands of Langerhans." These "islands" have no outlet through ducts, but produce an internal secretion which enters the blood stream directly through the numerous blood vessels with which they are supplied. It is the active principle of this internal secretion, known as insulin, which the Toronto investigators succeeded in separating from the other pancreatic extracts and in proving that it helped diabetic patients to utilize carbohydrates in a normal manner.

The interesting announcement appeared a short time ago of the appearance of Insulin-Mulford, a brand of insulin marketed by the H. K. Mulford Company under license granted by the University of Toronto.

Insulin-Mulford is prepared in accordance with the method developed by the Toronto investigators. Every lot is carefully tested and will conform strictly to the standards established by the Insulin Committee.

Insulin-Mulford—a highly purified and uniformly potent preparation—is now available for general distribution, in 5-cc. vials, in three concentrations, designated as 10-unit, 20-unit and 40-unit.

BOOK REVIEWS

ELEMENTS OF HYGIENE. Max Eugling. 384 pages, 131 illustrations. Urban and Schwarzenberg, Berlin, Wien, 1925.

The author aims in his series of lectures to give an abbreviated story of hygiene which may be readily understood by people at large interested in this subejct. It is written primarily for pharmacists, medicine students and physicians. A useful list of up-to-date literature on hygiene is included. The subject of hygiene is discussed in twenty-two chapters. The following should be of special interest to pharmacists: Water, hospitals, disposal plants, microbiological and pathological organisms, infection, immunity, invisible virus, disinfection, social and industrial hygiene.

The discussion of the various items is brief, of course.

Under tobacco the statement is made that the nicotine content ranges from 1.5 to 9 per cent. The unusually high content of 9 per cent. given should be verified. That HCn hydrocyanic acid

occurs in addition to nicotine, pyridine bases and CO in tobacco smoke appears worthy of mention in a new edition, as found by Baumberger, of Stanford University.

Print, arrangement by headings and illustrations, microphotographs and schematic sketches are excellent. While in some respects—the discussion of disinfectants, for instance—is rather general, in other respects, enough detailed information is given to enable the solving of given problems. A book broad in scope and only about $3 (Mk. 10.00 unbound, Mk. 12.00 bound), should prove very instructive and helpful.

ARNO VIEHOVER.

THE PHARMACEUTICAL POCKET BOOK FOR PRACTITIONERS AND STUDENTS. Eleventh edition, 1925. 438 pp.; 3 s. 6 d. The Pharmaceutical Press, London, W. C. I.

From a small beginning as a Pharmacy Students' Pocket Notebook in 1906 this handy volume has undergone numerous editions, so that the present one, the eleventh, just off the press, is now a book filled with very valuable information as can be seen from the following few selected chapter headings: Pharmaceutical Qualifications, Advice to Students, Scholarships and Prizes, Pharm. Society of Great Britain, Science and Art of Dispensing, Homœopathic Pharmacy, ℞ Abbreviations, Table of Solubilities, Percentage Calculations, Electrical Units, Specific Gravity, Hydrometers, Dilution of Alcohol Table, Physical Constants, Flashing Points, Materia Medica of Vegetable and Animal Origin, Water, Milk and Urine Analysis, Dictionary of Synonyms, Food and Diet, Notes on Bacteriology, Poisons and Antidotes, The Arsenic Act, Dangerous Drug Act.

The Dictionary of Synonyms and Trade Names in Common Use occupies eighty-four pages and is indeed very complete. It alone is worth the price of the book! The frontispiece is an excellent reproduction of the Br. Pharm. Soc. Building in London, a building of which British pharmacy can be justly proud!

The book is full of valuable information, a real "multum in parvo" and should also be better known among American pharmacists.

OTTO RAUBENHEIMER, Ph. M.

DIE MEDIZIN DER GEGENWART IN SELBSTDARSTELLUNGEN. Herausgegeben von Prof. Dr. L. R. Grote. Vol. IV. Octavo, 252 pp. 10 Mk. Verlay Felix Meiner, Leipzig, 1925.

The referee had the pleasure to review Vols. I, II and III of this excellent biography in AMER. JOUR. PHARM., November, 1924, pages 855-857. The present, fourth volume, contains autobiographies of the following medical authorities: Sigmund Freud, of Vienna; Adolf Gottstein, of Berlin; Otto Heubner, of Dresden; Johannes von Kries, of Freiburg; Hans Much, of Hamburg, and Norbert Ortner, of Vienna, together with fine reproductions of their photographs.

This being the last volume it concludes with a very complete double-column index of fourteen pages to the entire set. Therein we find the names of celebrated physicians, scientists, chemists and last, but not least, pharmacists. This set of books should be included in the medical and pharmaceutical libraries of the world!

OTTO RAUBENHEIMER, Ph. M.

HANDBOOK OF THE BRITISH FLORA. By George Bentham, C. M. G., F. R. S., with additions by Sir J. D. Hooker, K. C. S. I., C. B., F. R. S. Seventh edition, revised by A. B. Rendle, M. A., D. Sc., F. R. S., Keeper of Botany, British Museum. 12 mo., 606 pp. Cloth, 12 s. L. Reeve & Co., Ltd., 6 Henrietta Street, Convent Garden, London, W. C. 2.

The well-known British publishers of floras and natural history works have just issued a new edition of Bentham & Hooker's Handbook of the British Flora. In 1858 the well-known English botanist, George Bentham, published the first edition of this book which was to supply a much needed want, namely, to enable persons, even those having no previous knowledge of botany, to identify the wild flowers they might gather in their country rambles. Since the fifth edition in 1886 the work has been revised by another botanical authority Sir J. D. Hooker. The present, seventh edition has been brought up to date by another authority, the keeper of botany of the British Museum, Dr. A. B. Rendle. Thus the book during the sixty-six years of its existence has undergone seven editions, surely a record to be proud of!

The Flora is preceded by an introduction, "Outlines of Botany,"

containing the following chapters: Definitions and Descriptive Botany, Classification or Systematic Botany, Collection, Preservation and Determination of Plants, Glossary, Arrangement of the Text and Abbreviations, and Analytical Key to the Families and Anomalous Genera of the British Flora. The introduction has been shortened by the omission of the chapter on Vegetable Anatomy and Physiology, most of which was hopelessly out of date and was unsuitable for inclusion in a Flora.

The sixth edition of the book was published in 1892. The growth of knowledge during these thirty-two years has been incorporated in the present edition. The nomenclature has been brought up to date and there was added the etymology of the generic names and the correct pronunciation of the names of genera and species. Truly, steps in the right direction, whereby the somewhat dry study of botany is made more interesting as well as clarified! The work gives a true description of the flowering plants and ferns indigenous to and naturalized in the British Isles. It is not only adapted for the use of beginners and amateurs, but also for all students of systematic botany, including the pharmaceutical student. Besides, it is a valuable hand- and reference book for the pharmacist, including the pharmacist in the United States. Let us hope that the work will continue to live another thirty-four years, so as to celebrate its centennial!

OTTO RAUBENHEIMER, Ph. M.

WELTWANDERUNG ZWEIER DEUTSCHEN. Von Hermann Thoms and Luise Thoms. Octavo, 306 pp. M. 12. Verlag von Theodor Steinkopff, Dresden.

The excellent book before us is the travelogue of Prof. Dr. H. Thoms, director of the Pharmaceutical Institute, University of Berlin, and his wife. They left Berlin in July, 1923, sailed from Hamburg to New York and visited Philadelphia, Baltimore, Washington, Buffalo, Niagara Falls, Detroit, Chicago, Milwaukee, Madison and San Francisco. They then crossed the Pacific Ocean to Honolulu and Japan, where they arrived a few days after the terrible earthquake in September, 1923, which Dr. Thoms fully describes and illustrates. Six chapters are devoted to Japan, its people, customs and especially its scientific institutions. The travel continues to

China, the Philippines, and then to Java, where Dr. Thoms spent considerable time to study the preparation of smoking opium and quite especially the cultivation of cinchona. Excellent illustrations are given of different views in the botanical garden in Buitenzorg and the Dutch Government cinchona plantation in Tjinjiorean, where over 2000 male and female workers are employed. After devoting six chapters to Java, the Thoms family relates its travel to Sumatra, Ceylon, East India, through the Arabic and Red Sea, the Suez Canal and the Mediterranean to Barcelona, where again they set their foot upon European soil. After visiting Paris, "Home, Sweet Home," Berlin is reached again in March, 1924.

Philadelphia pharmacists will no doubt remember Prof. Thom's visit to the "City of Brotherly Love," and the reception given in his honor in the Bellevue-Stratford. In the chapter, "Philadelphia," he pays tribute to this hospitality and to Prof. LaWall, E. F. Cook and the H. K. Mulford Company. The heart of every alumnus of the Philadelphia College of Pharmacy will beat faster when he reads Prof. Thom's remark, "The Philadelphia College of Pharmacy, over 100 years old and renowned the world over, is one of the best pharmaceutical colleges."

Two errata in the book should be corrected in the revised edition. Page 19 Johnson & Johnson, "*Glas*fabrik" in New Brunswick should be "*Verbandstoff.*" Page 39, Office of *American* Druggist in Chicago should be *Western* Druggist.

The book is adorned with 187 illustrations, fifteen plates and one map, which greatly help to elucidate the text. This excellent work, written by a pharmacist and his wife, should be read by pharmacists and their better halves.

OTTO RAUBENHEIMER, Ph. M.

AUG 31 1925

AMERICAN JOURNAL of PHARMACY

SINCE 1825

A Record of the Progress of Pharmacy and the Allied Sciences

COMMITTEE ON PUBLICATION.

Charles H. LaWall, Ph. M., Sc. D. Joseph W. England, Ph. M. J. W. Sturmer, Pharm. D.
John K. Thum, Ph. M. Arno Viehoever, Ph. D. B. Fullerton Cook, Ph. M.

IVOR GRIFFITH, Ph. M., Editor

Henry Leffmann, A. M., M. D., Special Contributor

Vol. 97 AUGUST, 1925 No. 8

CONTENTS

Editorial:

What is Fresh Air? 505

Pharmacy Week 506

Original Articles:

Studies of Tests for Diethylphthalate. By Henry Leffmann and Max Trumper, Philadelphia, Pa. 507

Animal Aviators (Illustrated). By Marin S. Dunn, Philadelphia, Pa. .. 510

Differences in the Pharmacological Effects of Drugs Upon Animals and Man. By Fritz Külz, Leipzig. A Translation by Sigmund Waldbott, With Introduction by John Uri Lloyd 527

Standardization of Viscosity Pipettes. By Emil Gardos, Bloomfield, N. J. 541

The Shades of the Alchemists. (A Play.) By Charles H. LaWall, Philadelphia, Pa. 544

Accuracy of Hypodermic Tablets 557

The One Hundred and Second Annual Commencement of the Philadelphia College of Pharmacy and Science 561

Scientific and Technical Abstracts 568

News Items and Personal Notes 571

Book Reviews 575

Price $3.00 per Annum in Advance. Foreign Postage, 25 Cents Extra.

Single Numbers, 30 Cents. Back Numbers, 30 Cents.

Entered as Second-Class Matter at the Post Office at Philadelphia, Pa., Under the Act of March 3, 1879.

Acceptance for Mailing at Special Rate of Postage Provided for in Section 1103, Act of October 3, 1917, Authorized February 15, 1923.

PUBLISHED MONTHLY BY THE

Philadelphia College of Pharmacy and Science

145 North Tenth Street, Philadelphia

American Journal of Pharmacy

ESTABLISHED IN 1825

Four preliminary numbers were published at different times until in 1829, when the publication of the regular volumes began. Since then the publication has been uninterrupted. During the period from 1829 to 1852 four numbers were published annually, except in 1847, when five numbers were published. From 1853 to 1870 six numbers were published. Since this time twelve numbers have been published annually.

MANUSCRIPTS should be sent to the Editor. It should be stated in this connection that the Editor does not assume any responsibility in connection with the views or investigations of contributors, other than to exercise general care in the selection of matter.

Contributors are allowed a reasonable number of copies of this JOURNAL, free of charge, if applied for when the proof is returned.

REPRINTS, if desired, must be applied for when the proof is returned. The table below shows the *approximate* cost of reprints, the make-up of the pages to be identically the same as in the JOURNAL. The actual cost may vary from the figures given, and will depend upon the amount of presswork, paper, binding, etc. Reprints containing half-tones may be expected to cost somewhat more than the rates given.

	2 pp.	4 pp.	8 pp.	16 pp.	COVERS WITH TITLES	
25 copies	$2.25	$3.75	$7.75	$9.00	25 copies	$1.75
50 "	2.50	4.00	8.25	9.75	50 "	2.00
100 "	2.75	4.25	9.00	10.75	100 "	2.25
250 "	3.75	4.75	10.00	12.00	250 "	2.75

☞ **Our readers will find it to their advantage to carefully consult the advertising pages when desiring to correspond with STRICTLY FIRST-CLASS PARTIES.**